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The Santa Monica Freeway Diamond Lanes Volume II: Technical Report

Final Report
September 1977

Service and Methods Demonstration Program

U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration
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16. Abstract

The Santa Monica Freeway Diamond Lanes, a pair of concurrent-flow preferential lanes for buses and carpools linking the City of Santa Monica, California, with the Los Angeles CBD, opened on March 16, 1976 and operated amid much controversy for 21 weeks until the U.S. District Court halted the project. The Diamond Lane project marked the first time preferential lanes had been created by taking busy freeway lanes out of existing service and dedicating them to the exclusive use of high-occupancy vehicles.

This report summarizes the findings of the official, objective, independent evaluation of the project sponsored by the U.S. Department of Transportation as part of the UMTA Service & Methods Demonstration Program. The report addresses a broad range of project impacts in the following major areas: Traffic speeds and travel times; traffic volumes and carpool information; bus operations and ridership; safety and enforcement; energy and air quality; and public attitudes and response. Analysis shows that the project succeeded in increasing carpool ridership by 65% and the increased bus service accompanying the Diamond Lanes caused bus ridership to more than triple. Nonetheless, energy savings and air quality improvements were insignificant, freeway accidents increased significantly, non-carpoolers lost far more time than carpoolers gained, and a heated public outcry developed which has delayed the implementation of other preferential treatment projects in S. California.

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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
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yd^3	cubic yards	0.76	cubic meters	m^3
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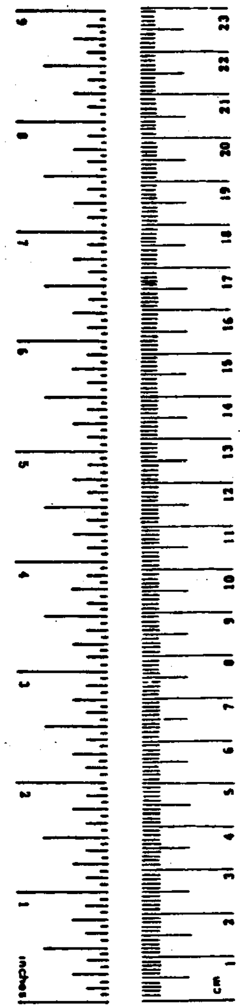

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
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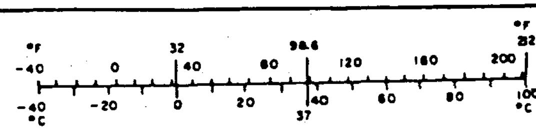
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	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



ACKNOWLEDGMENTS

This evaluation of the Santa Monica Freeway Diamond Lanes was prepared in the Los Altos, California offices of SYSTAN, Inc. under Contract Number DOT-TSC-1084, as part of the Service and Methods Demonstration (SMD) Program sponsored by the Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation. Dr. John W. Billheimer served as SYSTAN's project manager and principal investigator. Dr. Howard Simkowitz of DOT's Transportation Systems Center (TSC) served as technical advisor on the project, while Mr. Joe Goodman of UMTA was the project manager for the SMD Program.

Many individuals contributed to the development of the Diamond Lane evaluative report. Within SYSTAN, John W. Billheimer directed the evaluation and served as principal author of the report. Robert Bullemer was responsible for data processing, wrote the Chapter 8 report on Energy and Air Quality, and contributed to the chapters dealing with freeway operations and bus ridership. Carolyn Fratessa assisted with survey design and implementation, monitored public and media response, and wrote the Chapter 9 report on What Happened Off the Freeway. Arthur W. Simpson assembled and summarized data on other preferential lane projects, while Michael Holoszyc undertook special statistical studies of accidents and bus ridership and Andrew Canfield assisted with data processing and analysis. Gail Fondahl helped to analyze and describe traffic operations, ramp delays, and survey responses, while Carole Parker organized and edited the final report.

Although SYSTAN accepts full responsibility for the data tabulations and conclusions presented in this report, the evaluation would not have been possible without the cooperation and assistance of the many local agencies participating in the project. The collection of most of the voluminous traffic data reflected in the report was accomplished by the California Department of Transportation (CALTRANS) Freeway Operations Branch under the direction of Gary Bork and the supervision of Robert Goodell. Mr. Pat Conway supervised data collection activities of the Southern California Rapid Transit District (SCRTD) and Robert Ayer performed a similar function for the Santa Monica Municipal Bus Lines (SMMBL). Donald Bass and Robert Camou of the Los Angeles City Traffic Department (LADT) assembled data on surface street conditions. Lieutenant William Russell of the California Highway Patrol (CHP) supplied the viewpoint of officers enforcing the Diamond Lane restrictions, and supervised the collection of data on accidents, enforcement, and police deployment. Each of the above individuals contributed their insights and understanding to the preparation of the final evaluation report, as did Graham Smith and Paul Satja of the Los Angeles Mayor's Office. The photographs accompanying the summary exhibits in the text are the work of Robert Goodell of CALTRANS.

PREFACE

The Santa Monica Freeway Diamond Lanes opened on March 15, 1976, and operated amid much controversy for 21 weeks until August 9, 1976 when Judge Matthew Byrne of the U.S. District Court in Los Angeles halted the project and ordered additional environmental studies prior to its continuation.

Much of the controversy at the time consisted of conflicting claims regarding the ability of the project to accomplish its stated objectives of conserving energy, improving air quality and expanding effective freeway capacity by increasing the occupancy of buses and automobiles using the freeway. Some of these objectives had been attained by the close of the demonstration, although the cost in accidents, congestion and public outrage was far greater than anyone had anticipated. Major findings on the positive side of the ledger were:

- During the last seven weeks of the project, the Santa Monica Freeway carried 1.8% fewer people in 10.1% fewer automobiles than it had carried prior to the project in the morning and evening peak periods. The entire corridor, including parallel surface streets, carried 1% more people in 5% fewer vehicles.

- The number of carpools on the freeway increased by 65% during the project.

- In response to both the Diamond Lanes and a significant increase in transit routes and service frequency, daily bus ridership between the Westside study area and the Los Angeles CBD more than tripled, increasing from 1,171 riders per day prior to the project to 3,793 riders per day during the last week of Diamond Lane operation.

- Speeds recorded by carpoolers in the Diamond Lanes were both faster and more consistent than pre-demonstration speeds. Carpoolers traveling the length of the Diamond Lanes were able to save between two and three minutes over pre-project travel times and approximately five or six minutes over travel times in other lanes.

However, certain hoped-for benefits failed to materialize during the short life of the project:

- After an initial increase, fuel consumption levels on the freeway and adjacent city streets dropped slightly during the last seven weeks of the project, falling an estimated 0.8% below pre-project levels.

- Although it is impossible to make conclusive statements regarding air quality on the basis of the limited samples taken during the life of the project, estimates of vehicle emissions made on the basis of mileage computations indicate that emissions increased early in the project and dropped to pre-project levels by the close of the demonstration.

Moreover, the positive and neutral impacts of the project were counter-balanced by the following negative considerations:

- Freeway accidents rose markedly during the project. An average of 25 accidents per week occurred during Diamond Lane operating hours, roughly 2.5 times the weekly pre-project average.

- During the Diamond Lane demonstration, freeway speeds for non-carpoolers were both slower and less predictable than they were before the demonstration. Although speeds improved as the demonstration progressed, freeway driving time for non-carpoolers traveling the full length of the Diamond Lanes over the last seven weeks of the project were slightly more than one minute longer than pre-project levels in the westbound direction during the P.M. peak and more than four minutes longer in the eastbound direction during the A.M. peak.

- Average delays at the busiest metered ramps increased between one and five minutes per car during the peak hours of morning and evening operations.

- Combining ramp delays and slower freeway speeds, measured increases in total trip times for no-carpoolers traveling eastbound on the freeway in the morning ranged from six minutes per trip at the western end of the freeway to negligible increases at on-ramps near the CBD. Corresponding increases for westbound travelers in the evening ranged from seven minutes per trip for drivers entering near the CBD to insignificant delays west of La Cienega Boulevard for drivers entering midway along the length of the project.

- Aggregate travel speeds on surface streets paralleling the freeway slowed slightly during the demonstration, dropped by about 4.5%.

- The weight of the media and public opinion were solidly against the project. Eighty-six percent of corridor drivers surveyed, including the majority of carpoolers, felt that the Diamond Lanes were either harmful or of no benefit whatsoever.

After the close of the demonstration, conditions on the freeway approximated those experienced prior to the project. Although bus service continued and bus ridership remained high, at more than two and one-half times pre-project levels, the number of carpools dropped to within 5% of the number on the freeway before the Diamond Lanes were implemented.

Thus, the Santa Monica Freeway Preferential Lane project succeeded to some degree in attracting riders to carpools and transit, and increased freeway capacity with a minimum amount of additional construction and enforcement costs. However, the project brought about a significant increase in freeway accidents; energy savings and air quality improvements were insignificant; non-carpoolers lost far more time than carpoolers gained; and a heated public outcry developed which has delayed the implementation of other preferential treatment projects in Southern California and given planners and public officials in other areas ample cause for reflection before attempting to implement similar projects.

The effect of the Diamond Lanes on Los Angeles traffic, travel patterns and travelers was a complex one that cannot be adequately summarized in concise statements such as those listed above. Both the issues and the impacts were many-faceted, admitting as many different interpretations as there were freeway drivers. Nearly everyone in Los Angeles, by virtue of their daily tussle with traffic, qualifies as a traffic expert with a narrow range of specialization. The many different governmental agencies and institutions serving these experts have somewhat broader concerns than the individual driver, but the field of vision of any governmental agency is necessarily circumscribed by the agency's jurisdiction, history, and political outlook. In Los Angeles, the different agencies and public officials involved with the Diamond Lane project had substantially different views regarding the purpose, promises, prospects and relative success of the Lanes. During the demonstration, the press was filled with reports by drivers under the pressure of the daily commute and by agencies under the pressure of the media blitz, that touched only limited aspects of the problem and were sometimes badly distorted. At times, it seemed as if the parable of the six blind men and the elephant were being reenacted by thousands of rage-blinded commuters and hundreds of one-eyed officials, reporters, and television commentators.

The authors of this evaluation cannot claim markedly better eyesight than many of the drivers and officials in Los Angeles who held strong views regarding the merits or faults of their side of the elephant. The evaluators have, however, been blessed with more time to evaluate conflicting statistics and sort though the viewpoints of drivers, agencies and officials free from the pressures of commuting, project decisions, and the media glare. Although this time provides the perspective needed for a more objective view of the elephant, the evaluator is prey to a different set of pitfalls. In time, he comes to know every aspect of the elephant intimately, from the length of his trunk to the function and chemical composition of his digestive tract. These details, in themselves, may be scarcely more enlightening than the views of a single enraged driver or harassed official. In Los Angeles, moreover, the media-created circus surrounding the project was so diverting that it was difficult at times to concentrate on the measurement of the elephant's trunk, so that the measurement process necessarily had to be extended to cover the public unroar.

Unless the evaluator is careful, a detailed description of the elephant's extremities and the surrounding clamor may be just as distorted as those of the original six blind men. In attempting to report on all sides of the elephant, the authors recognize that they have probably provided more information than any single individual wants to know about the Diamond Lanes. Accordingly, the report has been developed at several levels of detail and divided into different sections covering the major aspects of the project: traffic speeds; vehicle volumes and occupancy; bus operations and ridership; safety and enforcement; energy consumption and air quality; and what happened off the freeway. Chapter 1 summarizes each of these topics in some detail, and is itself dotted with short listings of key findings to aid the reader interested in a specific aspect of the Diamond Lane experience. In addition, an executive summary has been prepared for the reader desiring an overview of the evaluation.

The final report has been published in two volumes:

Volume I: SUMMARY -- Contains the Executive Summary and Chapter 1, a topic-by-topic condensation of the technical report.

Volume II: TECHNICAL REPORT -- Contains the Executive Summary;
Overviews of the Project, Site, and Evaluation (Chapters 2, 3 and 4);
Freeway and Bus Operations (Chapters 5 and 6);
Safety, the Environment, and Public Response (Chapters 7, 8 and 9);
Survey of Other Preferential Lane Projects (Chapter 10); and
Appendices.

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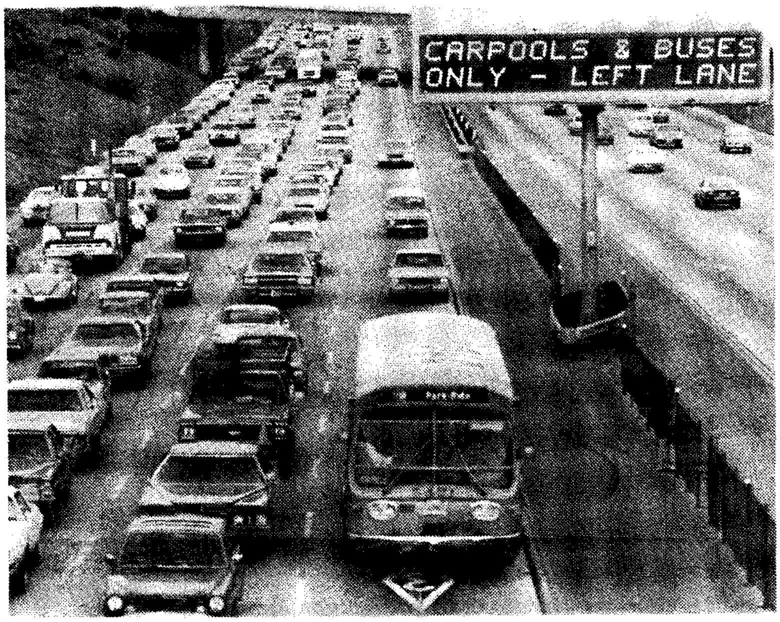
EXECUTIVE SUMMARY

INTRODUCTION

The Santa Monica Freeway, which connects the City of Santa Monica and downtown Los Angeles, is one of the most heavily-traveled freeways in the world, and is served by a variety of sophisticated traffic control devices, including metered on-ramps with preferential entry provisions at selected locations, a computerized surveillance system, and centrally-controlled electronic displays. On March 15, 1976, the California Department of Transportation (CALTRANS), acting in conjunction with the California Highway Patrol (CHP) and local bus operators, reserved the median lane in each direction of a 12-mile, eight-lane segment of the Santa Monica Freeway for the exclusive use of buses and carpools carrying three or more occupants. The reserved lanes, known locally as the Diamond Lanes, operated in each direction during the peak hours of traffic flow. No barriers separated these lanes from the remaining flow of freeway traffic. Implementation of the Diamond Lanes was accompanied by the introduction of a variety of express bus services and the opening of three new Park-and-Ride lots in Western Los Angeles.



The Santa Monica Freeway project marked the first time preferential lanes had been created by taking busy freeway lanes out of existing service and dedicating them to the exclusive use of high-occupancy vehicles. Although the Diamond Lanes entailed no major physical modifications or construction on the freeway itself, they generated considerable emotional reaction among freeway drivers and other residents of Los Angeles. The project neither started nor ended as scheduled. The original starting date was delayed by a combination of concerns including operational readiness, financial problems, a local dispute over the implications of nationwide labor protective agreements, and the Southern California rainy season. When the Diamond Lanes finally opened, the first day of operations was disastrous, featuring bumper-to-bumper traffic, long queues at on-ramps, a malfunctioning ramp meter, many accidents, outraged drivers, poor press notices, and derisive news commentary. As the project progressed, freeway performance improved somewhat and both bus and carpool ridership increased, but accidents remained a serious problem and the climate of public opinion and media reaction grew more hostile. The preferential lanes operated amid much controversy for 21 weeks until August 9, 1976, when Judge Matthew Byrne of the U.S. District Court in Los Angeles halted the project and ordered additional environmental studies prior to its continuation.

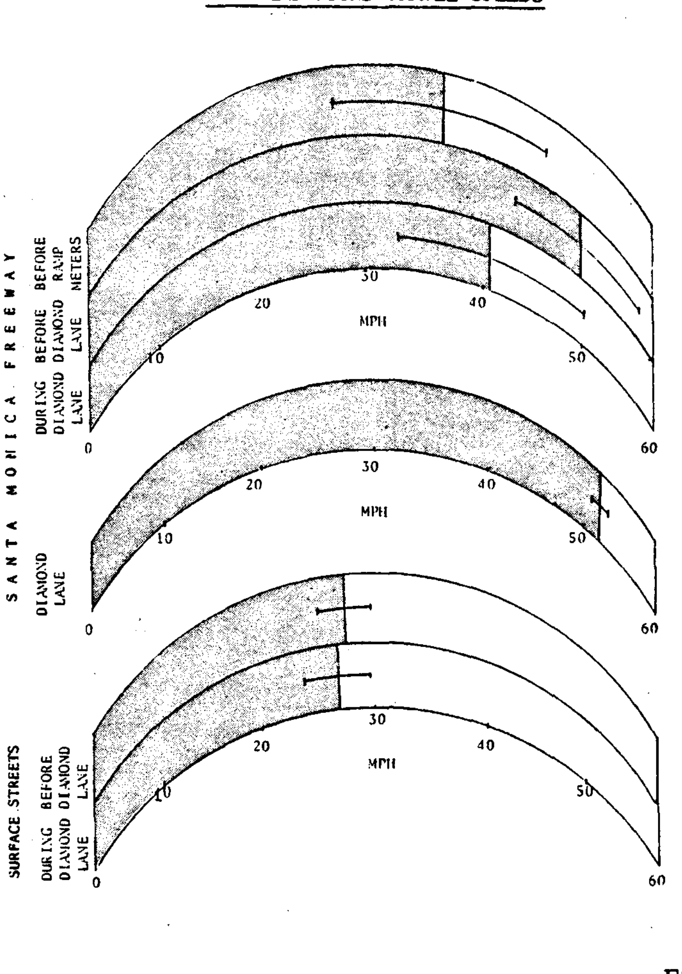
Much of the controversy surrounding the Diamond Lanes consisted of conflicting claims regarding the ability of the project to accomplish its stated objectives of conserving energy, improving air quality, and expanding effective freeway capacity by increasing the occupancy of buses and automobiles using the freeway. An independent analysis of the vast quantities of data assembled by both friends and foes of the project reveals that, although some of the stated objectives had been attained by the close of the demonstration, the cost in accidents, driver delay, and public outrage was far greater than anyone had anticipated. Major findings of the analysis are summarized below.

TRAFFIC SPEEDS AND TRAVEL TIMES

Vehicle Speeds

The dedication of the Diamond Lanes to the exclusive use of buses and high-occupancy vehicles, and the accompanying changes in ramp metering rates, had a marked impact on vehicle speeds on the Santa Monica Freeway. *The speeds of vehicles using the Diamond Lanes were significantly faster and steadier than the speeds of vehicles in the remaining non-preferential lanes, which were generally slower and less predictable than those experienced on the freeway prior to the initiation of the demonstration.* Although the speeds of non-carpoolers improved as the demonstration progressed, they never returned to meter-controlled, pre-project levels. Average freeway driving times for non-carpoolers traveling the full length of the project over the last seven weeks of the demonstration were slightly more than one minute longer than pre-project levels in the westbound direction during the evening and more than four minutes longer in the eastbound direction during the morning.

A.M. EASTBOUND TRAVEL SPEEDS



Average statistics do not provide a complete picture of travel times in adjacent lanes, since these times varied considerably during the morning and evening hours of operation. The non-carpooler entering the eastbound freeway at 6:30 A.M. found his travel time to Los Angeles increased by roughly one minute during the demonstration. By 8:00 A.M., however, the additional delays in freeway travel time approached nine minutes per trip. The difference between the average travel time measured over the full span of Diamond Lane operating hours and the actual travel times experienced by motorists during specific peak travel periods, coupled with the greater uncertainty associated with travel during Diamond Lane operations, helps to explain some of the skepticism with which freeway users viewed the average statistics reported in the press while the project was still in progress.

Speeds recorded by carpoolers in the Diamond Lanes were both faster and more consistent than pre-demonstration speeds. Carpoolers using the lanes typically traveled between two and five miles per hour faster than they had prior to the initiation of the demonstration. The Diamond Lanes provided a more pronounced advantage relative to the speeds in adjacent lanes during the demonstration, offering carpoolers and bus riders average speeds between 11 and 12 miles per hour faster than those available to general traffic.

Aggregate travel speeds on the surface streets paralleling the freeway slowed slightly during the demonstration, dropping by about 4.5% as former freeway users transferred to surface streets.

Entry Ramp Conditions

Over a period of two years prior to the Diamond Lane demonstration, traffic signals were installed on the Santa Monica Freeway on-ramps to control the number and spacing of cars entering the freeway during the peak hours. Before these ramp meters were installed, general vehicle speeds on the freeway were slightly slower than the speeds attained by non-carpoolers during the Diamond Lane demonstration. The installation of these ramp meters greatly improved traffic speeds on the freeway by limiting entering vehicles to a fixed rate of flow. Although vehicles entering the freeway spent an average of two minutes waiting at the ramp meters, this delay was more than offset by the time saved in traveling in the improved traffic conditions on the freeway itself.

Metering rates on most freeway access ramps were adjusted during the week preceding the opening of the Diamond Lanes. In some instances, these adjustments represented severe departures from pre-project conditions. The adjustments were designed to alleviate anticipated freeway congestion and, in most cases, increased the length of time motorists were required to wait in queues before entering the freeway. As the project continued, metering rates were readjusted in response to actual traffic conditions, but these attempts to fine-tune the system did not match the sweeping changes made before opening day in either the magnitude of the adjustments or the number of ramps affected.

Once the confusion and adjustments of the first week were past, few changes in ramp delays were observed during the peak hours of travel. *Average delays at the metered ramps carrying the bulk of entering traffic increased between one and five minutes per car during the project.*

At 12 of the 30 metered entry ramps, preferential access lanes permitted buses and vehicles with two or more occupants to bypass the meter system. The bypass lanes at these selected ramps saved buses and two-person carpools between two and seven minutes per trip during the Diamond Lane demonstration.

The average increases in queue lengths at freeway on-ramps were not so pronounced as the increases in ramp waiting times. There were relatively few instances in which the Diamond Lane metering changes caused vehicle queues to extend dramatically beyond the ramp storage capacity, and speed measurements showed that the queue increases did not appear to cause additional interference with traffic on north-south feeder roads.

Total Trip Times

Measured Freeway Trip Times. Considering both ramp delays and slower freeway speeds, measured increases in average trip times for non-carpoolers traveling eastbound on the freeway in the morning were as high as six minutes per trip for those drivers starting at the western end of the freeway and traveling to the CBD. Eastbound drivers entering the freeway about midway along the length of the project experienced negligible increases in total travel times. Corresponding increases for westbound travelers in the evening were as high as seven minutes per trip for non-carpoolers entering the freeway near the CBD. Westbound drivers using ramps midway along the project's length experienced negligible additional delays.

At each of the entry ramps with a bypass lanes for buses and two-person carpools, the amount of time saved by using the ramp bypass exceeded the amount of time saved by traveling in the Diamond Lane to the Lane's end. *That is, the relative delays imposed on single-occupant automobiles at preferential on-ramps were greater than those imposed by the Diamond Lane itself.*

Perceived Trip Times. The changes in freeway travel times encountered during the Diamond Lane demonstration may also be viewed in the light of the total door-to-door commuting times perceived by drivers in the freeway corridor. The average door-to-door trip reported by a sampling of 2,800 corridor drivers was 21 miles long, and took 37.4 minutes in the morning and 43.2 minutes in the evening. Diamond Lane carpoolers responding to a survey questionnaire reported an average savings of 1.5 minutes over pre-project travel times. Non-carpoolers reported an increase in trip times of 8.3 minutes in the morning and 9.4 minutes in the evening. These perceived increases are slightly higher than freeway measurements indicate are likely, and include a number of impossibly high reports (greater than 30 minutes) of average trip delays. Not unexpectedly, non-carpoolers appear to have overestimated the average delays accompanying the Diamond Lane demonstration, although measurements indicate that the delays encountered by a non-carpooler traveling the length of the project could have averaged as much as six to seven minutes per trip. Given the increased uncertainty accompanying travel in the non-preferential lanes, moreover, delays on any single day could have been much higher than the average figure.

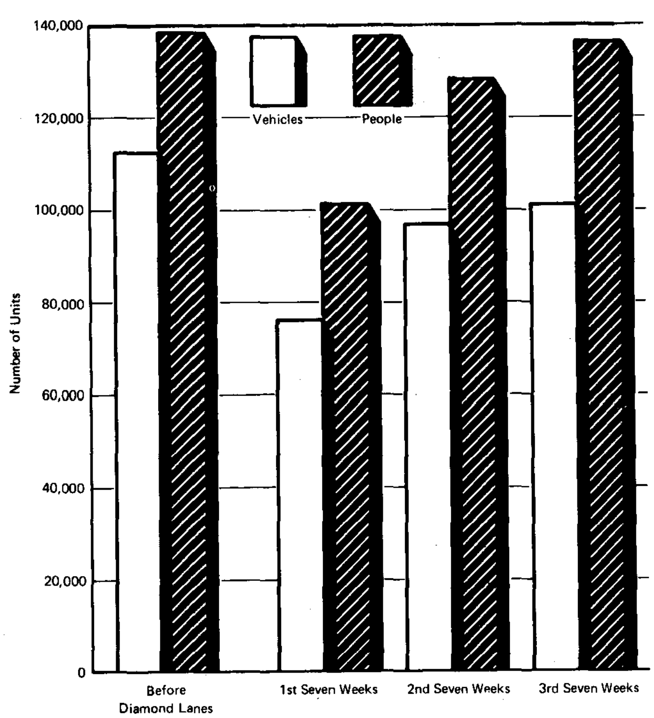
TRAFFIC VOLUMES

Freeway Traffic Volumes

The changes in travel speeds experienced during the demonstration were accompanied by significant shifts in traffic patterns. The total number of vehicles and people using the Santa Monica Freeway dropped markedly during the early weeks of the demonstration, and then rose steadily. The early decline in freeway traffic reflected a combination of carpool formation, growing bus ridership, and defection to surface streets by non-carpoolers. *By the close of the demonstration, the number of people using the easternmost segments of the freeway was within 2% of pre-project levels, while vehicle volumes had declined by 10%.* Summary Table 1 provides more detail on changes before, during and after the project as measured at observation points near the Los Angeles CBD.

VEHICLE AND PEOPLE THROUGHPUT AT CRENSHAW BOULEVARD

Santa Monica Freeway: 7 Hours, Both Directions



Measurements made at different points along the freeway reflect the same general pattern of usage depicted in Summary Table 1, although shifts in vehicle and passenger movement were less pronounced at locations farther removed from the CBD. Although directional trends on the Santa Monica Freeway are less pronounced than on most major freeways, the greatest changes in vehicle and passenger movement during the demonstration occurred in the peak directions of travel (eastbound in the morning and westbound in the evening), where congestion was greatest in the non-preferential lanes. By the last seven weeks of the demonstration, the freeway carried an average of 9% fewer people in 17% fewer vehicles in the peak directions of travel.

SUMMARY TABLE 1

AVERAGE DAILY VEHICLE AND PASSENGER STATISTICS

SANTA MONICA FREEWAY AT CRENSHAW BOULEVARD

(Seven-Hour Peak Periods, Both Directions of Travel)

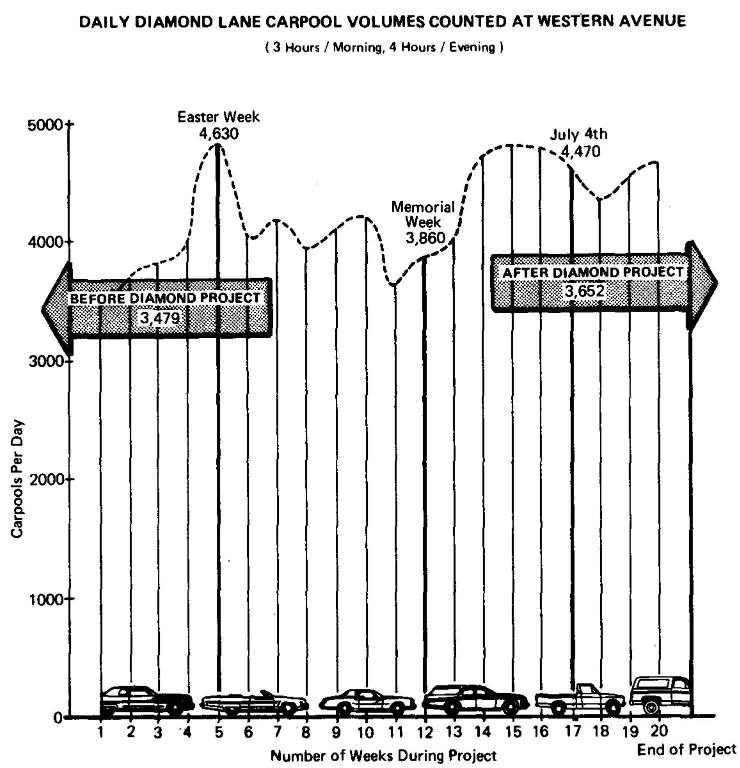
Statistic		Before Project	DURING DIAMOND LANE PROJECT First Seven Weeks	Second Seven Weeks	Final Seven Weeks	After Project
Total Vehicles	Number	113,135	76,738	97,197	101,678	112,059
	% Increase (Decrease)	---	(-32%)	(-14%)	(-10%)	(-1%)
Total People	Number	138,873	101,643	128,180	136,421	140,507
	% Increase (Decrease)	---	(-27%)	(-8%)	(-2%)	1%
Bus Ridership	Number	1,171	3,092	3,569	3,810	2,916
	% Increase (Decrease)	---	164%	205%	225%	149%
Passengers/ Vehicle	Ratio	1.23	1.32	1.32	1.34	1.25
	% Increase (Decrease)	---	8%	7%	9%	2%
Three-Person Carpools	Number	3,479	4,345	4,923	5,749	3,652
	% Increase (Decrease)	---	25%	42%	65%	5%

Vehicle volumes at all measuring points increased over pre-project volumes during the midday hours when the Diamond Lanes were not operational. The extent of the increase in vehicle volumes between the hours of 10:00 A.M. and 3:00 P.M. ranged between 2% and 6% over pre-project levels, indicating that drivers who had some flexibility in their choice of travel times elected to travel during the midday lull rather than face the much-publicized freeway congestion during Diamond Lane operating hours.

Prior to the project, each lane of the Santa Monica Freeway carried approximately 1,800 vehicles per hour during peak periods of flow. During the project, the Diamond Lanes carried an average of 300 vehicles per hour in the peak eastbound direction and 500 vehicles per hour in the peak westbound direction. Thus, the preferential lanes operated at between 20 and 30 percent of their vehicular capacity, and appeared relatively empty when compared with the heavily-congested adjacent lanes. Even so, the number of people carried by the Diamond Lanes approached the number carried by the remaining lanes by the end of the project, and the unused capacity in each preferential lane supplied the Santa Monica Freeway with at least as much reserve capacity as two additional lanes operating at pre-project occupancy rates.

Carpool Formation

The number of carpools carrying three or more people on the Santa Monica Freeway increased significantly during the demonstration, rising 65% above pre-project levels by the last seven weeks of the project. The growth of carpool usage was relatively steady throughout the project, with pronounced peaks during vacation periods.



Afternoon traffic in the eastbound Diamond Lane increased markedly during the Easter holiday week, and rose steadily following Memorial Day, suggesting that much of the increased Diamond Lane usage during these vacation periods may be attributed to groups of vacationing beachgoers returning from the ocean. Although no formal data were assembled to support this observation, Diamond Lane observers noted a number of surfboard sightings during the periods in question.

The average size of the carpools using the Diamond Lanes was 3.4 people. The primary incentive for forming a carpool mentioned by most of the carpoolers surveyed (63%) was to save money. Only 25% of the carpools responding to the survey were initially formed during the Diamond Lane demonstration period, and only 30% of these carpoolers identified the Lanes as the primary incentive behind their decision to carpool. With the disappearance of the Diamond Lanes, the number of carpools on the freeway dropped to within 5% of pre-project levels, suggesting that the Lanes themselves were more of an incentive to those carpools formed during the demonstration than the survey responses indicated.

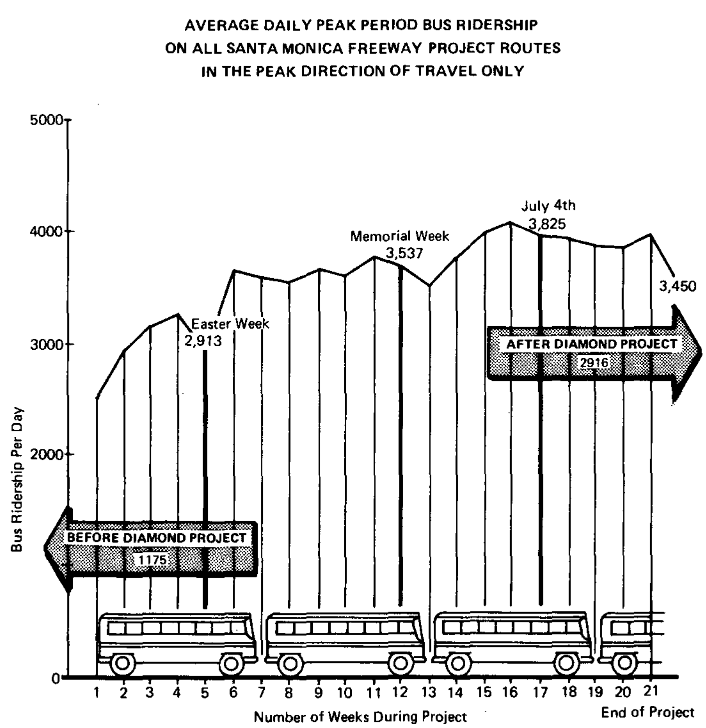
Surface Street Volumes

Traffic volumes on surface streets parallel to the freeway rose between 10% and 15% shortly after the demonstration was implemented, then appeared to subside somewhat during the summer months. Surface street vehicle occupancy rates did not change significantly during the demonstration.

Considering Santa Monica Freeway users, surface street travelers, and accounting for former Santa Monica Freeway users traveling on different freeways or during less-congested time periods, a rough comparison of vehicle and passenger movement across the entire Santa Monica Freeway corridor near the CBD indicates that *by the last seven weeks of the project, 1% more people were traveling in 5% fewer vehicles than were being used prior to the demonstration.*

BUS OPERATIONS AND RIDERSHIP

Two bus operators in the Los Angeles area participated directly in the Santa Monica Freeway Preferential Lane project by offering new services in conjunction with the opening of the Diamond Lanes: The Southern California Rapid Transit District (SCRTD), which operates 2,400 buses in the four-county Los Angeles area, and the Santa Monica Municipal Bus Lines (SMMBL), which operates about 100 buses in the Santa Monica area.



Bus service linking the Westside study area to the Los Angeles CBD improved significantly with the implementation of the demonstration. The addition of four new Diamond Lane feeder/express routes to the four already serving the Westside area more than doubled the number of Westside CBD workers living within walking distance of express bus service. In addition, three new Park-and-Ride routes were introduced to serve those Westside residents who were not within walking distance of a feeder/express route.

On the first day of the demonstration, 74 express bus trips were offered from the Westside area to the Los Angeles CBD during the morning peak, an increase of more than four times pre-project levels. Even without the Diamond Lanes, therefore, the marked improvement in service significantly improved the travel time by bus from most sections of the study area to the CBD. In the initial stages of the demonstration, service headways on new routes were generally set so that buses were no more than 15 minutes apart. As the project progressed, headways were adjusted to reflect ridership.

The introduction of the Diamond Lanes significantly improved the on-time performance of those SCRTD routes in existence prior to project implementation, cutting two minutes off the freeway travel time of the busiest line. Diamond Lane buses also generally exhibited better on-time performance than buses using other freeways without preferential treatment and buses using surface streets.

Ridership

Daily bus ridership between the Westside study area and the Los Angeles CBD increased from 1,171 riders per day prior to the project to 3,793 riders per day during the last week of Diamond Lane operation. Bus ridership rose rapidly during the first month following implementation, and continued to grow throughout the project. While the growth patterns were essentially the same for both SCRTD and SMMBL, SMMBL carried 26% of the combined average daily ridership with only 15% of the total daily bus trips. By the close of the project, most of SMMBL's buses were fully occupied, and the average occupancy during the project was 41.1 riders per trip, an occupancy rate of 82 percent.

In the case of SCRTD, the average occupancy during the project was 19.2 riders per trip, or 38 percent of the available seating capacity. This figure was well below pre-project levels, and stemmed from the policy decision to provide as much service as possible early in the project to maximize the possibility of attracting ridership. While the policy appears to have had the desired effect, it also put a large number of near-empty buses in public view during the early stages of the project. As the project progressed, unprofitable runs were eliminated and SCRTD occupancy rates improved markedly.

In general, both the new feeder/express routes and those routes existing prior to the demonstration succeeded in attracting patronage from the ranks of automobile drivers during the project, and an overwhelming majority of the bus riders surveyed expressed satisfaction with the service. *By the close of the project, the eight feeder/express routes had come close to meeting the aggregate long-term demand predictions for patronage on these routes, carrying nearly 30 percent of the CBD-destined trips projected to be within walking distance of a bus line.* The three new Park-and-Ride routes, however, fell far short of expectations and were all discontinued by September 1.

After the close of the demonstration and a five-week SCRTD bus strike, ridership on those freeway routes remaining in service was 17 percent below the peak attained during Diamond Lane operations. Ridership declines were greatest on those routes reporting the longest door-to-door travel times. Ridership drops were lowest on the one SMMBL route which continued operating through the strike. By early 1977, however, none of the routes had succeeded in attaining the peak ridership levels attained during the demonstration.

Attempts to isolate the impact of the Diamond Lanes themselves on bus ridership are frustrated by the short, uncertain life of the project, seasonal patronage variations, the media blitz, frequent and major changes in bus service frequency, fare increases, and the five-week strike of SCRTD workers which followed the closing of the demonstration. Recognizing these uncertainties, it can be argued that the extent of the Diamond Lanes' influence can at least be bounded by surviving ridership levels. If, in the light of service cutbacks, fare increases and a five-week strike, subsequent ridership levels still managed to rise to within 17 percent of their peak during Diamond Lane operations, it would seem that this 17 percent figure represents a fair estimate of the maximum drawing power of the Diamond Lanes alone. This aggregate figure varies from line to line, and might have been greater had the life of the lanes not been continually threatened. *Nonetheless, although the Diamond Lanes and the attendant publicity helped to attract a portion of the observed increase in bus riders, it appears that improvements in bus system coverage and service frequency were responsible for the bulk of the observed patronage increases.*

Revenues and Costs

Prior to the systemwide fare increases introduced by SCRTD and SMMBL in July and August, the average Diamond Lane bus rider paid 41.3¢ per trip. After the increases, the average rider paid 61.3¢ per trip. The fare increases seemed to have little impact on the demand for service on the feeder/express routes. Demand for Park-and-Ride services appeared to be far more sensitive to fares than demand for other services, and the fare increases applied the coup de grace to the already disappointing Park-and-Ride ridership.

The average operating cost per rider over the length of the project was $3.49 for SCRTD and $1.52 for SMMBL. These 21-week averages mask a general downtrend. In the case of SCRTD, cost per rider declined from $4.00 to $2.50 as unproductive runs were eliminated over the length of the project.

The relatively high cost-per-rider figures are directly related to the low productivities of the vehicles in Diamond Lane service. SCRTD buses carried an average of 7.2 riders per vehicle-hour, while SMMBL reported productivities of 16.6 riders per vehicle-hour. The explanation for these low productivities rests largely with the nature of the freeway express operation itself, with its long runs, lack of intermediate stops, limited backhaul potential, and the difficulty of generating more than one peak-period revenue run per bus.

POLICE DEPLOYMENT, ENFORCEMENT AND VIOLATIONS

Police Deployment

Highway patrol deployment doubled during the first weeks of the project, and gradually returned to normal (76 man-hours daily during the project operating hours) by the thirteenth project week. For the most part, the additional manpower used early in the project consisted of motorcycle units diverted from other freeways.

Enforcement

Although levels of police deployment returned to normal midway through the demonstration, enforcement activities remained considerably higher than normal throughout the life of the project. An average of 151 warnings and citations were issued daily, more than four times the estimated pre-project levels.

Enforcement of the Diamond Lane provisions was facilitated by the existence of a median strip where violators could be cited without being escorted across three or four lanes of traffic to the right shoulder of the roadway. Helicopter and roadside observers soon noted, however, that the use of the median for enforcement also interfered with the flow of traffic in other lanes. The use of the median for enforcement led to gawking and traffic slowdowns, particularly in the Number 2 lane adjacent to the Diamond Lane.

Violations

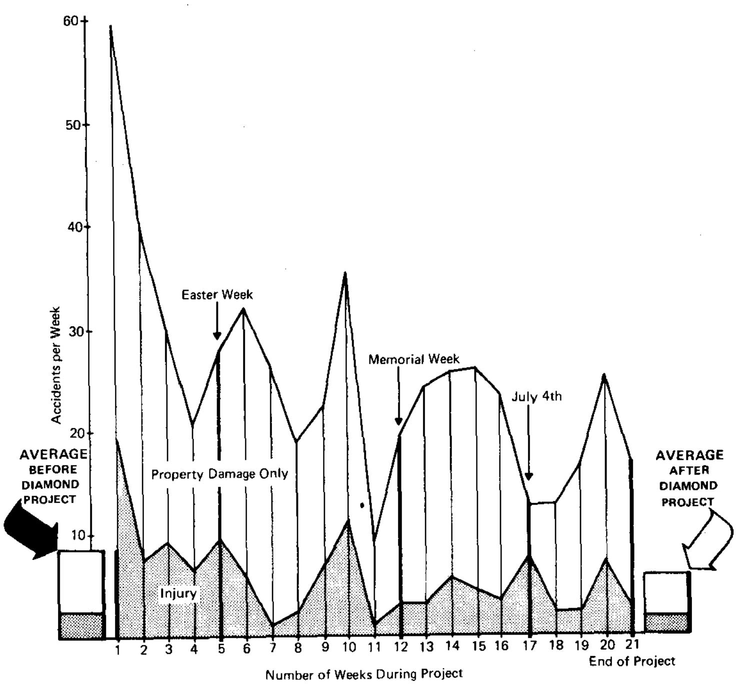
The Diamond Lane violation rate, defined as the ratio of vehicles with fewer than three occupants to the total number of vehicles in the lane, was high on the first day of the project and dropped immediately thereafter. On the opening day, 40% of all vehicles using the preferential lanes did so illegally. The violation rate then dropped rapidly, and fluctuated between 10% and 20% for the duration of the project. Most of the observed violations occurred at the fringes of the Diamond Lane operating hours.

SAFETY

Freeway Accident Patterns

One of the most disturbing aspects of the Diamond Lane project was the high incidence of freeway accidents accompanying the operation of the preferential lanes. Accidents increased markedly in the first week of the project, when 59 accidents were reported during Diamond Lane operating hours. Accident levels subsequently declined, dropping to an average of 18 accidents per week during the last month of the project, but they remained substantially higher than pre-project levels throughout the demonstration. During the 21 weeks of the demonstration, 527 accidents were reported during peak operating hours, an average of 25 accidents per week and roughly 2.5 times the pre-project average. Since accidents on the Santa Monica Freeway increased during the project while vehicle volumes decreased, the measured increases in accident levels are even more striking when expressed in terms of accidents per million vehicle-miles (accidents/MVM), a common measurement index. *Throughout the Diamond Lane project, the overall accident rate was 5.1 accidents/MVM, falling to 3.7 accidents/MVM during the last month of the demonstration. This closing rate was 2.6 times the rate of 1.40 accidents/MVM experienced during the same period in 1975.*

HISTORY OF FREEWAY ACCIDENTS DURING PEAK OPERATING HOURS



In addition to the absolute increases in the number of accidents occurring during project implementation, certain changes occurred in the relative pattern of accidents. The most notable of these changes was the marked increase in accidents in the Number 2 lane adjacent to the Diamond Lane. The number of accidents in this adjacent lane rose from under two accidents per week prior to the project to 14.8 accidents per week during Diamond Lane operating hours, an increase of more than 13 accidents per week. The average increase in accidents on the entire freeway during project implementation was on the order of 15 accidents per week. Thus, *a significant proportion of the overall increase in accidents was concentrated in the Number 2 lane.*

The relative incidence of rear-end accidents also increased significantly during the project, rising from 68% to 80% of all accidents, reflecting an increase in stop-and-go conditions in the non-preferential lanes -- particularly the lane adjacent to the Diamond Lane. No freeway fatalities occurred during Diamond Lane operating hours, and the relative severity of recorded accidents did not change significantly with the project.

Probable Causes of Freeway Accidents

A number of potential accident causes were postulated and analyzed in an attempt to account for the observed increase in accident levels. These included:

- Overreporting of minor accidents as a result of increased CHP presence;
- The distracting effect of CHP ticketing activities;
- Increased congestion resulting from the closing of a freeway lane to general use;
- The barrier-free operation of the Diamond Lanes at speeds well in excess of the speeds in adjacent lanes;
- The confusion, distraction and aggravation accompanying the novelty of the Diamond Lane concept; and
- Exogenous factors unrelated to the Diamond Lanes (i.e., historical citywide accident trends or a growing tendency to ignore the 55 m.p.h. speed limit).

While it is possible that each of the above factors contributed to one or more accidents during the demonstration, an analysis of these factors in the light of the accumulated accident data makes it seem unlikely that certain of the potential causes had a major influence on the accident picture. In particular, statistical analyses indicate that there is little chance that CHP reporting practices or any factors unrelated to the Diamond Lanes themselves could explain a measurable share of the accident increase.

The distracting effect of increased enforcement activities appeared to contribute somewhat to the increased accident rate. Although it is impossible to quantify the relative extent of this contribution, this factor does not seem capable of explaining a substantial share of the increase. Although the general pattern of CHP ticketing activities paralleled the overall accident pattern, and surveillance teams reported an increase in stop-and-go conditions where tickets were being issued, the increased CHP ticketing activities do not provide a direct explanation for the remarkable increase in accidents in the Number 2 lane, and a day-by-day correlation of accident and enforcement levels during the demonstration period explains a relatively small proportion of the observed accident variation.

Although increased congestion accompanying the removal of the Diamond Lanes from general use undoubtedly contributed to the increased accident rate, it is unlikely that the accident rate would have risen substantially if the Lanes had simply been closed to all traffic. Congestion levels equivalent to those experienced during Diamond Lane operations existed on portions of the freeway prior to both the addition of an extra lane in 1967 and the introduction of ramp meters in 1974 and 1975 without causing pronounced increases in accident levels. Moreover, with the increase in carpooling and bus riding accompanying the Diamond Lanes, and the concurrent shifting of some drivers to the city streets, the total number of vehicles per hour in each of the non-preferential lanes actually dropped slightly at several locations along the freeway.

The confusion, distraction and aggravation associated with the Diamond Lanes' novelty undoubtedly helped to account for the extremely high accident levels experienced during the first two weeks of the project. Because of the shortened duration of the project, the effect of this novelty factor on accident levels during the later weeks of the demonstration can never be known with certainty. The tendency to gawk and count the heads of passing carpoolers would certainly have diminished with time, and the frustration and aggravation of single-occupant automobile drivers might also have diminished if operations in the non-preferential lanes continued to improve. It is not possible, however, to project with confidence the accident level that would have existed following a longer period of operation. After extremely heavy accident rates during the first two weeks, accident levels tended to decline over the length of the project. Although the rate of decline slowed with time, the relative number of accidents per vehicle-mile was still declining slightly when the project was terminated.

The single factor that appears to account for the largest share of the accident increase is:

- *The pronounced speed differential between the free-flowing traffic in the sparsely-occupied preferential lane and the stop-and-go traffic in congested adjacent lanes, coupled with the frequent lane changes resulting from the variety of possible origins and destinations along the length of the project.*

Under normal operating conditions, an incident-related slowdown in one lane generally results in a slowdown in all lanes. Given the reserved nature of the Diamond Lanes, however, a slowdown in the remaining lanes usually just accentuated the speed differential between the Diamond Lane and the remainder of freeway traffic, increasing the difficulty of entering and leaving the Diamond Lanes safely. Motorists attempting to enter the Diamond Lane had to enter a faster traffic stream from a slower starting speed, while motorists attempting to leave the lane had to slow and attempt to find an opening in stop-and-go traffic. This problem was exacerbated by the large variety of trip origins and destinations in the Los Angeles area, which led carpoolers to enter and leave the Diamond Lanes at many points along the freeway. Regular and occasional carpoolers responding to the driver survey cited problems merging with slower traffic in leaving the Diamond Lanes as the greatest single difficulty encountered in using the lanes, and regular carpoolers felt that the discomfort of traveling faster than vehicles in the other lanes was just as disturbing as the difficulty of merging with these vehicles. As the speed differential increased, moreover, the ability to save time by using the Diamond Lanes attracted a few violators who dodged in and out of the Lane unsafely, attempting to stay one jump ahead of the CHP.

Implications of the Accident Picture

Since the ability to travel faster in a preferential lane is the chief inducement for attracting carpoolers and bus users to that lane, the fact that this ability increased accident levels significantly on the Santa Monica Freeway raises serious questions regarding the feasibility of the barrier-free preferential lane in certain settings. These questions appear to exist whether the lane is created by reserving an existing lane, as was done on the Santa Monica Freeway, or by creating an entirely new lane, as was originally contemplated on the San Diego Freeway in Los Angeles. Conceivably, the addition of a new barrier-free preferential lane to an existing freeway could also result in increased accidents if stop-and-go traffic conditions exist in the non-preferential lane, a significant speed differential is maintained between these lanes and an underutilized preferential lane, and destinations are scattered so that carpoolers enter and exit at many points along the lane.

If the usage of a preferential lane increases with time, either because more carpools are formed or because enforcement is relaxed, the speed differential will decrease and accident levels can be expected to drop. As the speed differential drops, however, the inducement to use a preferential lane drops as well. In theory, the number of carpools should grow over time until the marginal amount of time saved by switching to a carpool exactly balances the perceived inconvenience of making the switch. In practice, the level of accidents occurring before this equilibrium point is reached may be unacceptable to society, or the equilibrium point itself may result in an unacceptable accident rate.

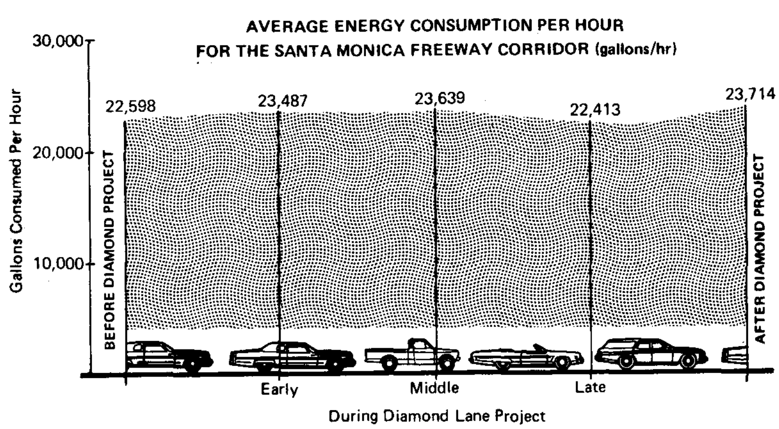
Surface Street Accidents

One of the potential side effects of the Diamond Lane project was the possibility that traffic diverted from the Santa Monica Freeway to surface streets might increase the number of accidents on those streets in the corridor surrounding the freeway. A sampling of eleven major surface routes paralleling the freeway for the first four months of the project revealed that total accidents on those streets had increased by 8.8% over the four-month period prior to the project, and increased by 5.2% over the average level experienced in a similar time period during the five years preceding 1976. *Although surface street accident levels were seen to increase slightly during the demonstration, statistical evidence linking these increases with the Diamond Lane project is inconclusive.*

ENERGY AND AIR QUALITY

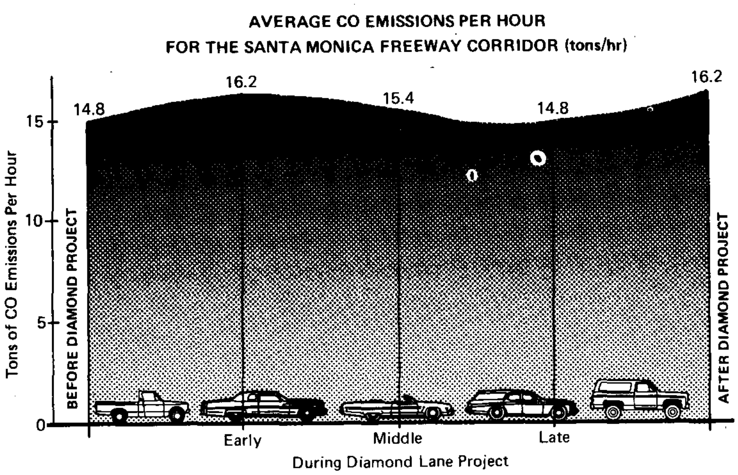
Fuel Consumption

Fuel consumption estimates based on vehicle mileage records indicate that, even allowing for increased idling time at on-ramps, gasoline consumption declined on the Santa Monica Freeway during the Diamond Lane demonstration. At the same time, fuel consumption actually increased on all parallel surface routes that were sampled. The net effect for the entire east-west corridor was a slight increase in fuel consumption of approximately 500 gallons per hour during the first fourteen weeks of the project. *By the last seven weeks of the project, the total energy consumption was 185 gallons per hour lower than the pre-project level of 22,958 gallons per hour, a savings of 0.8% over pre-project levels.*



Because of increased congestion and idling time, fuel consumption rates for non-carpoolers had increased by 6% by the close of the project. These increases were offset by the savings accompanying increases in carpool and bus usage. Each solo driver switching to a carpool or bus was estimated to save roughly eleven gallons of gasoline per week.

Air Quality



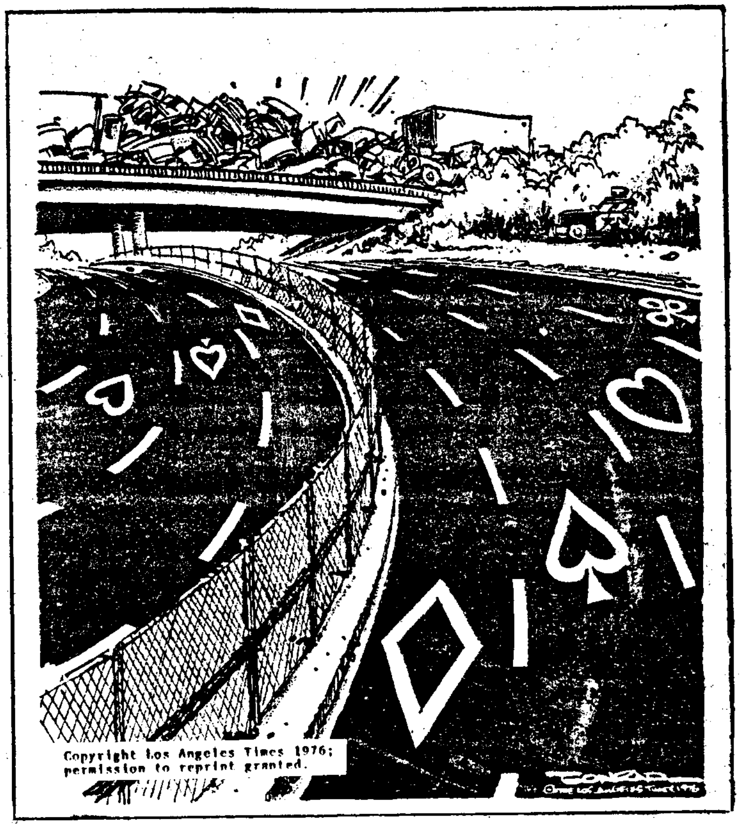
On the basis of vehicle mileage computations, corridor vehicle emissions rose early in the project and dropped to pre-project levels by the time the project closed. Measured air samples showed a general decrease in carbon monoxide concentrations during the project. In view of the small sample sizes, seasonal changes, meteorological variations, and analytic uncertainties, however, it is impossible to make conclusive statements regarding the precise impact of the Diamond Lanes on air quality.

WHAT HAPPENED OFF THE FREEWAY

Statistical summaries quoting freeway speeds, vehicle volumes, bus ridership and accident rates do not begin to convey the full picture of the Santa Monica Freeway Diamond Lane demonstration. The Diamond Lane experience was not confined between the guardrails of the Santa Monica Freeway. The demonstration quickly became a media event, generating reams of newsprint, radio and television coverage, vocal public reactions, political debate, lawsuits, banners, slogans, badges, cartoons, and at least one song. *From their implementation to their dissolution, the Diamond Lanes were never far from public view and, when in view, they were treated as an eyesore.*

Media Coverage

During the 21 weeks of Diamond Lane operation, the three major daily newspapers covering the project--the morning Los Angeles Times, the afternoon Herald-Examiner, and the Santa Monica Evening Outlook-- produced an average of nine articles and editorials per week on the Diamond Lanes. The predominant tone of the articles



was negative, and the editorials were solidly against the project. Although the operations on the freeway improved following the disastrous opening day, when the newspapers carried banner headlines proclaiming "Freeway Chaos," newspaper coverage grew steadily more hostile as the demonstration progressed. Recurring themes in the press treatment of the project were:

- o The operational failure of the lanes ("A Total Flop," Times, June 11, 1976);
- o The distasteful, coercive nature of the use of disincentives to encourage carpooling ("Freeway Folly," Herald-Examiner, March 11, 1976);
- o Bureaucratic recalcitrance ("CALTRANS Needs Education," Valley News, April 13, 1976); and
- o The credibility of the data published by the project's sponsors ("Dishonesty With Diamonds," Times, June 16, 1976).

The Diamond Lanes were also a popular subject for radio and television coverage, and provided a platform for many public figures figures seeking public exposure. As in the case of the press, the general tenor of the coverage provided by local and national radio and television stations was hostile to the project. Perhaps the most hostile and least balanced of all media coverage was provided by the radio disc jockeys, whose jibes ("you'll get home tonight if it takes all year") reached motorists while they were in the middle of their congested commuting period.

Project Promotion

Although the full extent of the public and media outcry was not anticipated by the project participants, it was recognized in advance that the Diamond Lane project was likely to generate adverse public reaction, and an extensive marketing campaign was developed with the joint aims of promoting buses and carpools and encouraging public acceptance through a program of information and education. Given the extent of the pre-project advertising campaign, which included television and radio announcements, newspaper advertisements, the use of the changeable message signs on the freeway itself, and brochures distributed at freeway on-ramps, it is unlikely that many regular users of the Santa Monica Freeway were unaware that March 15, 1976 marked the opening of the Diamond Lanes. Although the appearance of the lanes themselves should have come as no surprise, opening day commuters did have reason to be surprised by several of the unannounced adjustments accompanying the opening of the lanes, including the tightening of ramp meter rates and the barricading of a slip ramp at the interchange of the Harbor and Santa Monica Freeways near the CBD. These unannounced adjustments undoubtedly contributed to the opening day confusion, and helped make March 15 "Mad Monday."

Following Mad Monday, the advertising campaign was drowned out by the media outcry and the project's sponsors, placed on the defensive, were able to do little to counter the tide of adverse public reaction.

Public Response

Surveys, interviews, telephone calls, newspaper polls, public hearings, and letters to newspaper editors occurring during and after the project all revealed an overwhelmingly negative public response to the Diamond Lanes. *In the most extensive survey undertaken, eighty-six percent of the corridor drivers surveyed -- including the majority of carpoolers -- felt that the Diamond Lanes were either harmful or of no benefit whatsoever.* But public response to the Diamond Lane project was not limited to such formal avenues as survey responses and letters to editors. Residents of Los Angeles managed to find unique ways of expressing their general distaste for the Diamond Lanes. On opening days, nails were spilled in the lane by a disconsolate motorist, and a "baggy bomber" used paint-filled balloons to obliterate several of the painted diamonds in the lane. On June 3, the "Citizens Against the Diamond Lane" slowed Diamond Lane users by staging a mock funeral procession in the lanes, and they later attempted to hang anti-project signs from a freeway overpass. A smaller, less vocal group of "Citizens for the Diamond Lanes" was organized and developed a newsletter to champion their cause. Entrepreneurs sold bumper stickers and badges carrying comments on the lanes, while college students offered their services as riders for a fee to drivers wishing to qualify as carpoolers, and the media reported a brisk sale of mannequins designed to gull observers into believing one driver and two dummies constituted a three-person carpool.

All of the anti-Diamond Lane activities were reported by the media, which helped to create and sustain the climate of negative public opinion. It is impossible to know whether the public outcry was generated by the negative public image, or whether the media image simply reflected public outrage. Whichever came first, both the public and the media were in full cry early in the project, and each supported the other as the attack on the lanes progressed.

Any attempt to lay the full blame for the hostile climate of public opinion on the media both oversimplifies and overstates the case. It is unlikely that the negative media reports alone could have generated such a hostile response if the reports were not reinforced by a negative impact on the lives of the public. In Los Angeles, the negative media image of the Diamond Lanes was reinforced daily for over 100,000 freeway users who found their daily commute trip lengthened by a project designed to benefit a perceptibly smaller proportion of the traveling public.

Institutional and Political Climate

Several factors contributed to the stormy political weather encountered during the Diamond Lane demonstration. These included:

- The complexity of transportation planning, financing, and decision-making in the Los Angeles area;
- The changing philosophy, policies and personnel in the State transportation agency; and
- The scheduling of the demonstration in an election year.

All of these factors combined in a setting where everyone talks about transportation conditions but few are able to do anything about them. Transportation plans have proliferated as the number of federal, state and local agencies with an interest in transportation has multiplied. Los Angeles' fragmentation of public power and authority meant that a large number of government agencies and elected officials had some purview over the Diamond Lane project. Each decisionmaker had his own concept of project goals, and the degree of involvement and commitment to the Diamond Lanes varied greatly from agency to agency. When the media spotlight turned on the project, the public saw not a united front but a number of public agencies and elected officials pointing accusing fingers at the lead agencies, while other officials remained prudently silent. The adversary role adopted by several public agencies responsible for transportation activities hindered both the free flow of project information and the coordination of project decisions. CALTRANS, the lead agency responsible for project implementation, went from a state of flux immediately prior to the project to a state of siege during the demonstration. In the period immediately preceding the project, the agency was in a state of transition that included shifts in executive responsibility at the State level as well as sweeping layoffs locally. The shuffling of responsibilities, layoffs, and changes in management caused problems in both planning continuity and pre-project data collection. Once the project began, the new faces at CALTRANS were confronted with a new set of problems. Whereas the agency had become accustomed to public pressure over the building of freeways, the Diamond Lanes represented a new concept with a new set of aims and enough adverse side effects to lead some within the agency to question whether CALTRANS was justified in defending the project. As CALTRANS struggled to assess the operations on the freeway, deal with the hostile press, and evaluate a number of complex issues involving the project's future, an impatient press and public blistered the agency for its apparent intransigence and insensitivity to the needs of the citizens.

Public reaction and the media din were exacerbated by the frequent and public opposition of several elected and appointed City and County officials. The level of opposition ranged from responsible criticism on the part of some officials who had worked with project personnel in an attempt to make the Diamond Lanes more acceptable to their constituents to simple attempts on the part of other officials to align themselves publicly with the opposition to a clearly unpopular project. Responsible opposition and objective analysis had to clamor for a hearing alongside of simplistic arguments, emotional appeals, and self-serving electioneering. The Diamond Lanes even became a pawn in the election-year battle for the approval of funds for a rapid rail system in Los Angeles (STAMP OUT DIAMOND LANES: VOTE YES FOR RAPID TRANSIT). In the face of the opposing clamor from the media, public, and elected and appointed officials, those officials who might have favored the project found it prudent to remain silent, and little in the way of a constructive public dialogue emerged. There is little doubt that the continual public threats to the Lanes' existence led many potential carpoolers to deter any commitments to shared riding until the opposition was silenced and the project achieved a more permanent status.

The Legal End

Although the life of the Diamond Lanes was continually being threatened by the media and the public, and State and local officials had drafted terminating legislation, the demonstration was eventually done in by what at the time seemed the least likely suspect, a lawsuit in the U.S. District Court of Appeals. The lawsuit only indirectly addressed the merits of the project, focusing instead on the alleged failure of CALTRANS and UMTA to comply with the requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) by filing an Environmental Impact Report on the project. On Monday, August 9, 1976, Judge Matthew Byrne ruled that Environmental Impact Reports should have been filed under both State and national environmental laws, and ordered that the freeway be returned to pre-project status by Friday, August 13, 1976.

OBSERVATIONS AND IMPLICATIONS

The Santa Monica Freeway preferential lane project succeeded to some degree in attracting riders to carpools and transit, and increased the person-moving capacity of the freeway without requiring additional levels of police deployment. However, the project brought about a significant increase in freeway accidents, non-carpoolers lost far more time than carpoolers gained, and a heated public outcry developed which has halted the implementation of other preferential treatment projects in Southern California, giving planners and public officials in other areas ample cause for reflection before attempting to implement similar projects.

The Negative Impact of Lane Removal

Whereas other preferential lane projects have constructed additional lanes or converted lanes in off-peak directions to preferential use, the Santa Monica Freeway Diamond Lane project marked the first time preferential lanes were created by taking busy freeway lanes out of existing service and dedicating them to the exclusive use of high-occupancy vehicles. This aspect of the project contributed to most of the negative impacts recorded during the demonstration. The removal of two lanes from general use contributed heavily to the congestion and confusion on opening day, was a slight but important factor in the increased accident rate, and appears to have been one of the chief sources of public dissatisfaction with the project. Many freeway users felt strongly that they had paid for the lanes with their gasoline taxes and were entitled to go on using them. The lane preemption and the resulting slowdown were viewed with hostility by most corridor drivers, who appeared to perceive the preemption as a plot to force individuals out of their own cars, a plot designed by meddling bureaucrats to inconvenience many for the sake of a few. Moreover, the number of project beneficiaries were perceived to be even fewer than their numbers indicated because they traveled three-to-a-car, or rode in buses that were often half-empty, and did not fill the Diamond Lanes to capacity.

The Effect of Geographic Sprawl

Because of the scattering of trip origins and destinations throughout Los Angeles, relatively few users of the Santa Monica Freeway are destined for the CBD. The lack of a focal point for trip destinations made carpool formation relatively difficult and decreased the pool of potential riders of the CBD-directed bus service. In practice, the scattering of origins and destinations also meant that drivers were likely to want to enter and leave the Diamond Lanes at points all along their 12.5-mile length. The need to enter and leave the lanes at many different points greatly increased the possibility of accidents and made freeway operation less safe than it might have been if all drivers had exited at a common destination with provisions for safe merging.

Accidents and the Absence of Barriers

Another aspect of the Diamond Lane demonstration that contributed to the project's disappointing performance was the absence of barriers between the preferential lane and the congested adjacent lanes. Frequent vehicle shifts in and out of lanes operating at markedly different speeds contributed heavily to the increase in accidents. The problem of accidents in barrier-free operation is a serious one, and deserves further study. In other areas, and in Los Angeles itself, preferential treatment lanes separated from the general flow of traffic have been successful in improving carpool and bus ridership without increasing either accident rates or public acrimony.

The Success of Ramp Metering

One positive aspect of the Santa Monica Freeway experience which has been largely ignored was the performance of the ramp meters in allevaiting freeway congestion and smoothing traffic flow before, during and after the project. Prior to the project, the meters alone had so improved freeway traffic speeds that the Diamond Lanes suffered somewhat by comparison. The Diamond Lanes themselves offered only a marginal one- or two-minute improvement at best over the meter-controlled speeds generally available to all traffic prior to the project. Conditions in the non-preferential lanes did not approach metered pre-project levels, although freeway speeds with both ramp meters and Diamond Lanes operating were faster than speeds when neither the meters nor the lanes were operational. Where available, moreover, carpool bypass lanes on the on-ramps offered more of a time savings to carpools than the Diamond Lanes themselves. *Thus, the ramp meters bypasses, which were safer and--surveys showed--less objectionable to the public than the Diamond Lanes, actually offered a greater time savings to carpoolers than the preferential freeway lanes, while the meters themselves improved freeway traffic flow.*

The Question of Credibility

One of the most serious controversies emerging during the demonstration turned on the question of data credibility. The sponsoring agencies were collecting data as the project progressed, and CALTRANS became the source for disseminating project statistics. As "CALTRANS' project" came under attack, so did the data it issued. Other agencies began drawing different conclusions from the CALTRANS data, and some local groups--including the press itself--began collecting and issuing their own data. The free-form use of different numbers and different reference bases during the demonstration made it difficult for the public to know who or what to believe, and led the press to question the credibility of project participants. The credibility of project foes was rarely questioned by the media.

Under the best of circumstances, there will always be some degree of ambiguity associated with traffic data. In many instances, statistics concerning the Diamond Lane project were produced under the worst of circumstances, having been hurriedly processed under rigid deadlines in the glare of publicity, and interpreted by agencies with a vested interest in attacking or defending the project. Problems encountered in the data collection and evaluation phases of the project ranged from simple human miscalculations to complex computer failures. In retrospect, the picture of the project that emerges from a more thorough examination of the data is somewhat different from that presented by both proponents and opponents of the project in the midst of the "battle of numbers" waged during the demonstration itself.

SECTION TWO: OVERVIEW

2.0 PROJECT OVERVIEW

2.1 CAPSULE DESCRIPTION

The Santa Monica Freeway, which connects the City of Santa Monica and downtown Los Angeles, is one of the three most heavily traveled freeways in the world, carrying approximately 240,000 vehicles per day. The freeway is flanked by a broad band of arterial streets offering alternative routing possibilities, and is served by a variety of sophisticated traffic control devices. These include metered on-ramps with preferential entry provisions at selected locations for vehicles with two or more occupants, a computerized surveillance system, and centrally-controlled electronic displays.

On March 15, 1976, the median lane in each direction of a twelve-mile, eight-lane segment of the Santa Monica Freeway was reserved for the exclusive use of buses and high-occupancy vehicles carrying three or more occupants. Until March 15, the reserved lanes had been open to general traffic, and no barriers separated these lanes from the remaining flow of freeway traffic. The preferential lanes operated in each direction during the peak hours of traffic flow. The designation of the preferential lanes was accompanied by the introduction of a variety of express bus services and the opening of three new Park-and-Ride lots in Western Los Angeles.

From the standpoint of freeway operations, the opening day of the project was disastrous, featuring bumper-to-bumper traffic, long queues at on-ramps, many accidents, an outraged public, poor press notices, and derisive news commentary. As the project progressed, freeway performance improved somewhat and both bus and carpool ridership rose markedly, but accidents remained a problem and the climate of public opinion and media reaction grew more hostile. The preferential lanes operated amid much controversy for 21 weeks until August 9, 1976, when Judge Matthew Burne of the U.S. District Court in Los Angeles halted the project and ordered additional environmental studies prior to its continuation.

The preferential lane project, known locally as the Diamond Lane Project, was jointly sponsored by the California Department of Transportation (CALTRANS), the Southern California Rapid Transit District (SCRTD), the Santa Monica Municipal Bus Lines (SMMBL), and the California Highway Patrol (CHP) in an effort to improve air quality, reduce energy consumption, and increase effective freeway capacity by increasing the occupancy of buses and automobiles using the freeway. Other local agencies participating in the project included the Los Angeles Police Department (LAPD), the Los Angeles Department of Traffic (LADT), the Office of the Mayor of Los Angeles, and Commuter Computer (a local non-profit organization providing carpool matching service).

Since the dedication of an existing freeway lane to high-occupancy traffic was a controversial measure with impacts that were incompletely understood, it was essential that the full range of these impacts be measured and evaluated with a high degree of statistical precision in order to ensure the greatest possible level of understanding, not only in the area served by the Santa Monica Freeway but in all areas interested in implementing similar preferential freeway lanes. To this end, the Urban Mass Transportation Administration (UMTA) sponsored a detailed evaluation of the impacts of the Diamond Lane Project as part of its Service and Methods Demonstration (SMD) Program.

2.2 OBJECTIVES

One of the primary goals of the Santa Monica Freeway preferential lane project was to improve the people-moving capacity of the Freeway by transporting the same number of people in fewer vehicles. The participating agencies established the following specific local objectives:

To explore and evaluate concepts aimed at increasing vehicle occupancy on heavily-traveled urban freeways by creating incentives to encourage public transit ridership and carpooling;

To improve air quality in the Los Angeles South Coast Air Basin by reducing the number of low-occupancy vehicular trips;

To contribute to the local and national goals of energy conservation by optimizing passenger trips through public transit ridership and carpooling;

To reduce existing peak-hour congestion delays on the Santa Monica Freeway by increasing the ratio of travelers to vehicles using the Freeway;

To improve transit reliability and reduce transit travel times by providing an exclusive lane for bus and carpool travel

To achieve a better understanding of public attitudes toward automobile use, carpooling, transit ridership and preferential lanes, and to trace the effect of these attitudes on mode choice behavior; and

To assess the benefits and costs of a variety of alternative approaches to providing preferential freeway treatment for high-occupancy vehicles and acquire a better understanding of the law enforcement and traffic safety implications of each approach.

These local objectives met the following broad objectives of the Service and Methods Demonstration (SMD) Program:

To reduce trip times for transit travelers;

To increase transit reliability; and

To improve transit vehicle productivity.

2.3 KEY ISSUES TO BE EVALUATED

The Santa Monica Freeway project marked the first time a preferential lane project had been initiated by taking a busy freeway lane out of existing service and dedicating it to the exclusive use of high-occupancy vehicles. As such, the project could be implemented with significantly lower levels of capital investment and set-up time than other preferential treatment concepts of interest in the Los Angeles area and other parts of the United States. The project was one of four preferential treatment concepts initially scheduled for testing and evaluation in the Los Angeles area. The other three concepts entailed the following measures:

1. Construction of separate roadbeds for the exclusive use of buses and carpools;

2. Widening of existing roadways to provide an additional concurrent-flow lane for the exclusive use of buses and carpools; and

3. Creation of reserved-entry lanes for buses and carpools at metered on-ramps.

Thus, one of the aims of the project evaluation has been to provide a solid foundation for comparing the Santa Monica Freeway project with these other preferential treatment concepts. The Santa Monica Freeway itself offered more than one type of preferential treatment to buses and high-occupancy vehicles. At twelve of the metered on-ramps providing access to the Santa Monica Freeway, preferential bypass lanes provided immediate access for buses and vehicles carrying two or more occupants. To the extent possible, the evaluation plan has attempted to isolate the relative contributions of the metered entry ramps, the preferential bypass lanes, and the Diamond Lane itself to the measured impacts of the total project.

Since no barriers separated the Diamond Lane on the Santa Monica Freeway from lanes serving non-carpoolers who enjoyed the use of the lane prior to project implementation, the issues of safety, enforcement, and public response have been key concerns in the evaluation. Other key issues relate to project objectives and address questions concerning vehicle occupancy, air quality, energy consumption, transit ridership, congestion, travel speeds on both the Freeway and surface streets, transit reliability, travel times, and vehicle productivity.

2.4 ORGANIZATIONAL PARTICIPATION

2.4.1 Federal Participants

At the federal level, participants in the Santa Monica Freeway preferential lane demonstration evaluation included UMTA, the Transportation Systems Center (TSC), an evaluation contractor selected by these two agencies, the Federal Highway Administration (FHWA), and a survey contractor selected by this agency. The UMTA Project Manager was responsible for overseeing and guiding all aspects of the demonstration. TSC assisted UMTA in its activities and monitored the efforts of the evaluation contractor, approving the evaluation plan and reviewing all reports. SYSTAN, Inc., the evaluation contractor selected by TSC, prepared a detailed evaluation plan;[1] monitored the implementation of this plan; coordinated local data collection efforts; performed specialized data collection tasks; assisted in the design of survey instruments; assembled, reduced, and tabulated data; analyzed project results; and prepared this final report. The FHWA, through its contractor Market Facts, Inc., conducted a concurrent series of "before and after" home interview surveys designed to ascertain attitudes toward transit and carpooling and to establish a behavioral data base to be used in analyzing changes in CBD-oriented travel resulting from the demonstration project. The results of this series of home interviews are currently being evaluated and will be documented in a separate report to be produced under FHWA guidance.

2.4.2 Local Participants

A number of local agencies were jointly responsible for planning the operational phase of the demonstration project and for assisting in the design of many individual elements of the evaluation plan. Those agencies which were primarily responsible for project implementation were the four participating members of the Joint Project Board established to plan, implement, and direct the Diamond Lane project and to administer the federally-funded grant for marketing and data collection.

2.4.2.1 Joint Project Board Members - The four organizations forming the nucleus of the Joint Project Board were:

- State of California, Department of Transportation (CALTRANS)

  General Responsibilities: construction, operation and maintenance of California highways.

  Specific Project Responsibilities: Acting through its District 7 Los Angeles office, CALTRANS served as the lead agency responsible for project planning and operation. The District 7 office developed preliminary plans, installed the preferential lanes, adjusted ramp metering rates, and made all related operational changes.

- Southern California Rapid Transit District (SCRTD)

  General Responsibilities: the major provider of public transit in Los Angeles County.

  Specific Project Responsibilities: Established criteria for Park-and-Ride lots, identified alternative lot locations, purchased and maintained the lots, planned and implemented seven new express bus routes, upgraded service on four existing routes, and administered the UMTA Project Demonstration Grant.

- City of Santa Monica - Santa Monica Municipal Bus Lines (SMMBL)

  General Responsibilities: The major public transportation carrier for the City of Santa Monica.

  Specific Project Responsibilities: Planned and introduced one new express bus route and modified existing routes to feed Diamond Lane express service.

- California Highway Patrol (CHP)

  General Responsibilities: Enforcement of traffic laws on California highways.

  Specific Project Responsibilities: Planned enforcement tactics, deployed patrol units, and worked closely with CALTRANS on enforcement and safety-related aspects of overall project design.

As the project evolved, CALTRANS became identified in the public's eye as the institution most responsible for planning and operating the Diamond Lane project. Accordingly, the agency served as the focal point for most of the criticism leveled at the project.

2.4.2.2 <u>Other Local Participants</u> - In addition to the members of the Joint Project Board, several other local agencies participated in the planning and implementation of the Diamond Lane Project. These agencies included:

- <u>Los Angeles Police Department</u> (LAPD)

  General Responsibilities: The LAPD is responsible for law enforcement in Los Angeles, including the enforcement of traffic laws on surface streets. In this capacity, the LAPD enforced traffic regulations on surface streets adjacent to the Santa Monica Freeway, and collected surface street accident data.

- <u>Los Angeles Department of Traffic</u> (LADT)

  General Responsibilities: The LADT is responsible for the operation and maintenance of surface streets in Los Angeles. CALTRANS freeway operations were initially coordinated with the LADT to ensure smooth operation of City streets in the vicinity of freeway on-ramps. The LADT also collected data documenting the effect of the preferential lane project on surface streets and processed accident data collected by the LAPD.

- <u>Office of the Mayor of Los Angeles</u>

  General Responsiblities: The Mayor's office participated in the planning of project marketing and implementation and helped to monitor public response to the preferential lane.

- <u>The Southern California Association of Governments</u> (SCAG)

  General Responsibilities: As the regional government body with jurisdiction over the project area, SCAG was the creator of the 1974 Short-Range Transportation Plan which included a program for the preferential treatment of high-occupancy vehicles and which became the regional input to the State Transportation Plan prepared by CALTRANS.

- <u>County of Los Angeles Road Department</u>

  General Responsibilities: The County Road Department is responsible for the construction and maintenance of the Los Angeles County road network.

- <u>Commuter Computer</u>

  General Responsibilities: Commuter Computer is a publicly supported non-profit corporation devoted to the promotion of carpooling, vanpooling and buspooling in the South Coast Basin of Southern California. Commuter Computer provided a carpool matching service for Westside commuters affected by the Diamond Lane project.

Representatives of the above agencies participated regularly in the meetings of the Joint Project Board. At the request of the City of Los Angeles, a Project Operations Committee consisting of representatives of the four Board organizations and such City agencies as the LAPD, the LADT, and the Mayor's Office was established to respond to the need for on-going operational decisions and deal with citizen concerns.

As the controversy surrounding the project increased, certain of the participating local agencies openly adopted adversary positions. This was particularly true of the LADT, which publicly called for the closing of the Diamond Lanes and participated in the U.S. District Court suit as a witness for the complaining party.

2.5 PROJECT DESCRIPTION

2.5.1 Services and Innovations

2.5.1.1 The Diamond Lanes - The median lane in both directions of a 12.6-mile segment of the Santa Monica Freeway was reserved for the exclusive use of buses and vehicles carrying three or more persons. An overview of the project, as originally conceived and advertised prior to the March 15 opening date, appears in Exhibit 2.1. The preferential Freeway lanes, known locally as the Diamond Lanes, were marked with large painted diamonds and directional signs strategically placed along the Freeway. The Diamond Lanes ran east and west and were bounded by Lincoln Boulevard in Santa Monica and the Harbor Freeway in Los Angeles. No special stickers or permits were required to use the Diamond Lanes. There were no barriers partitioning the lanes, so buses and carpools were free to enter or leave the lanes anywhere along the route. The preferential lane rules applied between 6:30 A.M. and 9:30 A.M. (originally 6:00 A.M. to 10:00 A.M.) and between 3:00 P.M. and 7:00 P.M. Mondays through Fridays. The Diamond Lane rules were enforced by the California Highway Patrol (CHP) officers. The wide median shoulder area provided adequate space to issue citations, so that violators did not have to be escorted through heavy traffic in the other lanes.

2.5.1.2 Transit Service - The implementation of the Diamond Lane project was accompanied by the introduction of four new feeder/express routes linking the Westside area to the Los Angeles CBD. In addition, four bus routes operated by SCRTD prior to the Diamond Lane project were able to take advantage of the preferential lane, and three new SCRTD routes were established to serve newly-opened Park-and-Ride lots. On the opening day of the project, then, eight feeder/express routes and three Park-and-Ride routes served the Westside study area. These bus routes provided peak-period express service to and from downtown Los Angeles at 10- to 15-minute headways. The geographic configuration of these routes is shown in Exhibit 2.1. All the Diamond Lane routes except Line 10 serving downtown Santa Monica were operated by SCRTD. SMMBL also initiated a new crosstown feeder service (Line 14) operating within the Santa Monica city limits to provide access to the various Diamond Lane express routes.

The three new Park-and-Ride lots serving the Westside area were opened by SCRTD at the following locations:

	Auto Capacity
1. Fox Hills (south of Slauson at at Marina Freeway)	200
2. Century City (southeast corner of Olympic Boulevard and Avenue of the Stars)	300
3. Southeast Santa Monica (corner of Centinela and Ocean Park Boulevards)	220

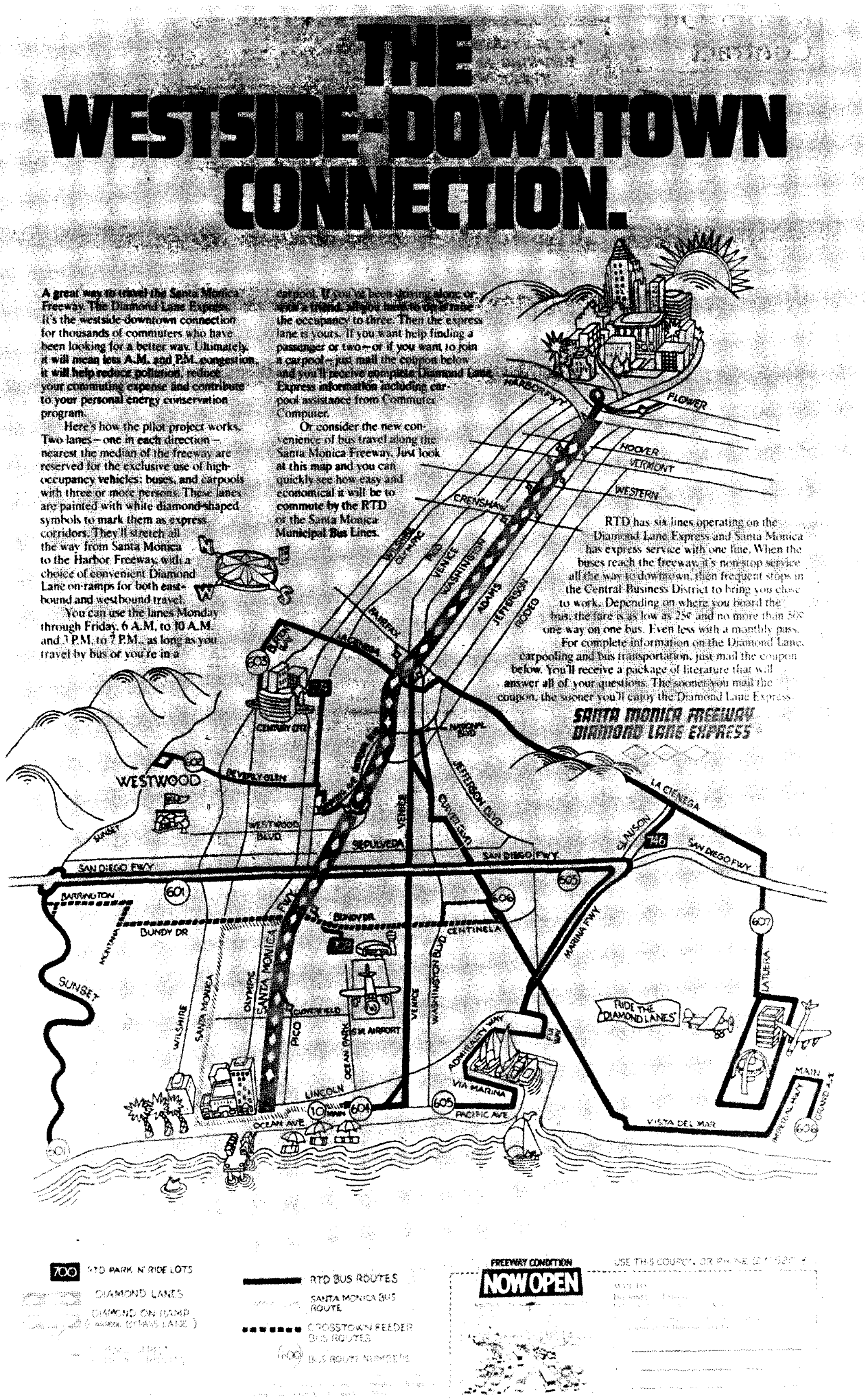
The Century City lot was closed midway through the Diamond Lane demonstration due to a lack of patronage. Operation of the two remaining Park-and-Ride lots was discontinued shortly after the court injunction opening the Diamond Lanes to all vehicles. Most of the other bus routes introduced at the time of project initiation remained in operation following the injunction.

Both SMMBL and SCRTD instituted fare increases during the Diamond Lane project. Fares on Diamond Lane routes varied markedly from line to line and depended on zonal boundaries, park-ride surcharges, monthly pass policies, and eligibility for discount fares offered to students, senior citizens and the handicapped. At the start of the project, the average Diamond Lane bus rider paid 41.3¢ per trip. After the fare increase, which occurred on July 1 for SCRTD and August 2 for SMMBL, the average rider paid 61.3¢ per trip, an increase of 20¢ or 48.4% over the initial rates.

2.5.2 Existing Freeway Features

2.5.2.1 Metered On-Ramps. The volume of traffic entering the Freeway via on-ramps was controlled before, during and after the demonstration by metering signals to maintain free flow on the Freeway. Metering rates, which are pre-set manually, were adjusted to compensate for the increased Freeway congestion accompanying

EXHIBIT 2.1: PROJECT OVERVIEW



the Diamond Lane project. At 12 of the 30 metered on-ramps, preferential access lanes are provided so that buses and vehicles with two or more occupants may bypass the metered system. The location of these preferential access lanes is mapped in Exhibit 2.1.

2.5.2.2 Computerized Surveillance and Electronic Signs - As part of the 42-mile surveillance loop established by CALTRANS, detectors on the Freeway transmit signals to a computer located in downtown Los Angeles. This electronic surveillance system provides instantaneous information on Freeway traffic, permitting the rapid detection of congestion due to accidents or other incidents. This computer also displayed information about traffic conditions and Diamond Lane use on electronic signs strategically placed along the Freeway. Exhibit 2.2 shows an electronic sign displaying the message "Diamond Lane Info -520-8111." The figure also shows a double row of cars queueing behind the metered lights at an on-ramp.

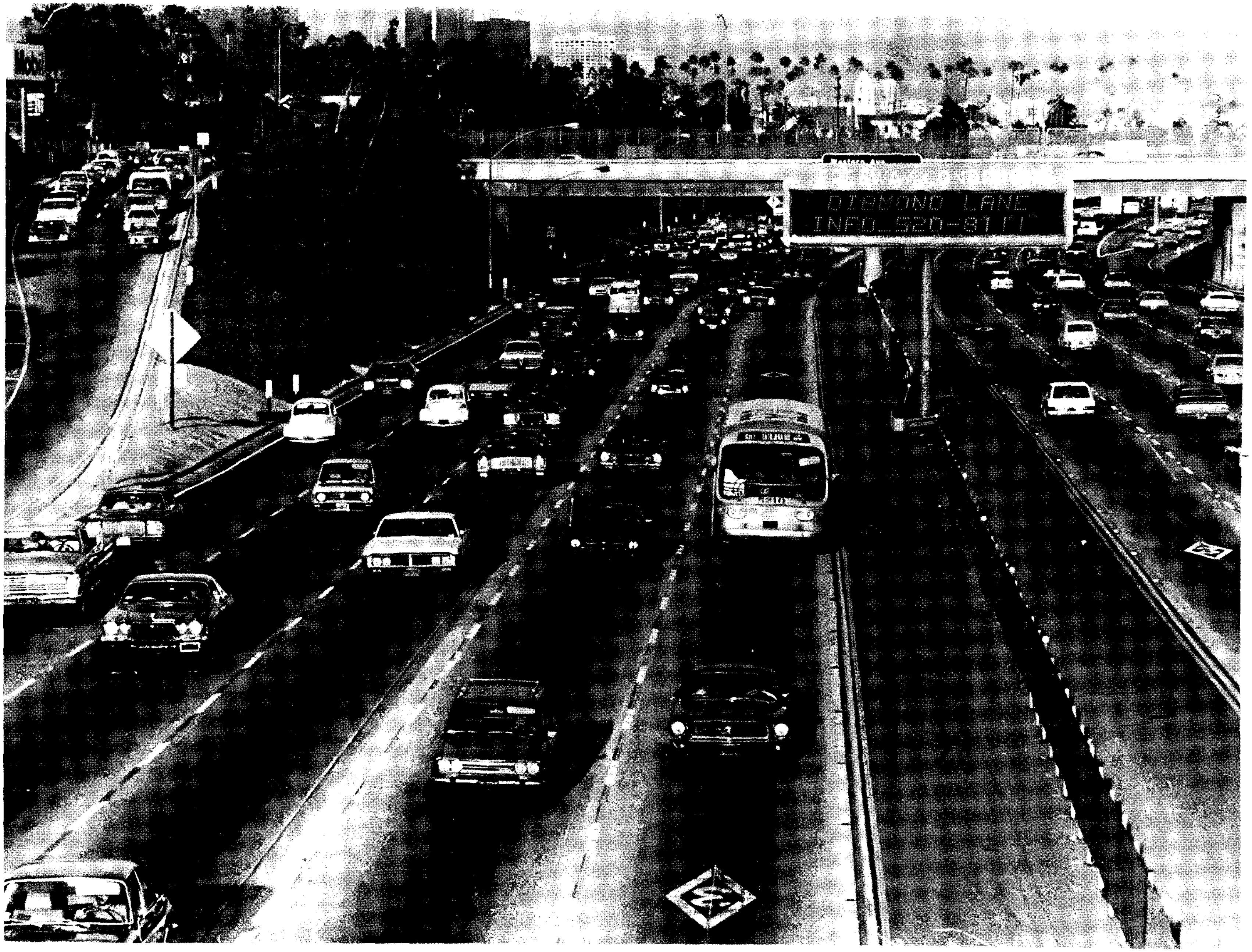
2.5.3 Other Related Activities

2.5.3.1 Marketing - Carpool formation and transit usage were encouraged by a marketing campaign conducted by a subcommittee of the SCRTD-CALTRANS Joint Project Board. This effort included newspaper advertisements, radio and television broadcasts, and the distribution of brochures designed to inform the public about the project. An estimated total of $368,000 of UMTA's funds were allocated to this marketing campaign, with $100,000 going to CALTRANS for automobile user information and $268,000 to SCRTD and SMMBL for transit user advertising.

In response to adverse public reaction following the inception of the Diamond Lanes, an ad hoc marketing campaign was initiated by CALTRANS and SCRTD directed at workers in the downtown Los Angeles area. Personnel from these agencies visited businesses and offices in the CBD, disseminating information on carpool formation and transit usage.

2.5.3.2 Phone Center - In cooperation with the Los Angeles Mayor's Office, a telephone information was set up to provide Los Angeles residents with information on bus schedules, carpooling, alternate routes, and preferential lane use. This call-in center also provided a forum for the expression of public opinion concerning the project. The telephone answering service was started fifteen days before the project began, and was maintained for three weeks after implementation. When the number of incoming calls dwindled, the center was disbanded and callers were referred directly to CALTRANS. The forty telephone lines were answered by volunteers and personnel from CALTRANS, SCRTD, SYSTAN, Commuter Computer and the Mayor's Office.

EXHIBIT 2.2: ELECTRONIC MESSAGE SIGN ON SANTA MONICA FREEWAY



2.5.3.3 Carpool Information - Free assistance in forming carpools was offered by Commuter Computer, a local non-profit organization supported by the City and County of Los Angeles. People filing a carpool application form with Commuter Computer received a list of carpool candidates who live and work near them and have compatible schedules; they could then call these candidates and form a carpool on their own. It is estimated that the average length of time required to form a carpool after filling out the application was one month.

2.5.3.4 Vanpool Program - Six weeks after the Diamond Lane project began, Commuter Computer, Crocker Bank, and Atlantic-Richfield introduced an experimental vanpool program offering door-to-door transportation to employees of the mid-Wilshire Boulevard area near downtown Los Angeles. This subscription service was supplied by ten-passenger Dodge vans equipped with luxury accessories. The vans were owned by Crocker Bank and leased to Commuter Computer, which made the van assignments. The vans were driven by volunteers, who were allowed to take them home at night and on weekends. The drivers rode free, while the cost to passengers depended on the distance traveled. For example, a fifty-mile round-trip cost $49 per month. Initially, twenty vans were used to serve 200 commuters working in a four-square-block area in the mid-Wilshire district.

2.6 PROJECT HISTORY

Important occurrences in the planning and implementation of the Santa Monica Freeway Diamond Lane project are listed chronologically in the following calendar of events:

February 15, 1972	Appearing before the Los Angeles City Council Ad Hoc Committee on Rapid Transit, City Traffic Engineer S.S. Taylor urges that "high-occupancy and emergency preferential lanes" be established on freeways to the Westside, Hollywood, and San Fernando Valley as a substitute for the rapid transit "starter line" proposal then before the Council Committee.
January 22, 1973 and July 2, 1973	The Federal Environmental Protection Agency (EPA) introduced proposals to achieve in Los Angeles the air quality standards established by the Federal Clean Air Act of 1970. These proposals would have imposed severe restrictions on automobile usage. In addition to improving ambient air quality, it was hoped that these proposals would also conserve energy and reduce congestion.

August 30, 1973 — Local officials, threatened by the severe restrictions proposed by EPA, submitted a "Clean Air Plan" as an alternative. Included in this plan was a commitment to convert a pair of lanes on the Santa Monica Freeway to preferential use. In a review of the Diamond Lane experiment,[2] the Southern California Section of the American Institute of Planners noted that "a few agencies, among them the SCRTD, argued that the Clean Air Plan was not a viable alternative to the EPA proposals."

October 3, 1973 — The State Senate passed Senate Bill 1221, ordering the Southern California Rapid Transit District to prepare for the State a "plan for preferential facilities for high-occupancy vehicles."

December 6, 1973 — Following up on Senate Bill 1221, the State Senate passed Senate Concurrent Resolution 84 directing the State Department of Transportation to "promptly take steps to make available appropriate lanes on the highways of California metropolitan areas for the exclusive use of public transit buses and multiple-occupancy motor vehicles during commute hours."

February 19, 1974 — A proposed Transportation Needs Framework was put forth by a member of the Los Angeles County Board of Supervisors. The plan included preferential treatment for buses and carpools on existing lanes of the Santa Monica and other freeways. It was argued at the time that putting buses on freeways should be given precedence over plans for rapid transit.

March 22, 1974 — The Comprehensive Plan of Preferential Facilities for High Occupancy Vehicles, prepared by a professional consulting firm in response to Senate Bill 1221, was released to the public.

March 26, 1974 — The City Council adopts a motion originally proposed by Councilmen Edelman and Bradley to request the California Department of Public Works to establish exclusive lanes for HOV on all freeways in the Los Angeles area or, as an alternative, to establish a pilot project on the Santa Monica Freeway.

April 1974 — The Southern California Rapid Transit District released its proposed Public Transportation Improvement Program. The plan adopted many of the features of the plan ordered by Senate Bill 1221, providing for express bus service on existing freeway lanes (including Santa Monica) reserved for high-occupancy vehicles.

April 14, 1974	The Southern California Association of Governments adopted a short-range transportation plan for the region, including a program of preferential treatment for high-occupancy vehicles. Preferential lanes were scheduled for the Santa Monica, Artesia, Long Beach, San Diego, and Golden State Freeways, as well as on five major arterial streets. This short-range plan provided Southern California's input to the California State Transportation Control Plan. CALTRANS assumed the responsibility for testing different preferential treatment concepts on freeways and implementing the most effective of these concepts throughout the region. The Santa Monica Freeway preferential lane project was one of the first projects tested because it involved no major physical modifications, construction costs were comparatively very low, surveillance equipment was in operation on the freeway, and a good network of surface streets existed to handle diverted traffic.
July 1974	Meters were installed on the freeway's westbound access ramps.
April 16, 1975	UMTA awarded a $807,800 grant to SCRTD for a one-year trial preferential lane project on the Santa Monica Freeway, with an initial implementation date of June 15, 1975.
May 1975	Preliminary evaluation plan was published by SYSTAN, Inc. Meters were installed on the eastbound access ramps of the freeway between the San Diego and Harbor Freeways. The project implementation date was rescheduled for September 29, 1975 as a result of a variety of concerns including operational readiness and funding availability.
June 15, 1975	SCRTD put four express lines on the Santa Monica Freeway on the originally-scheduled implementation date, intending to phase in existing service in advance of the preferential lane demonstration.
August 1975	The pre-implementation, FHWA-sponsored Home Interview Survey was conducted by Market Facts. Problems in filling out the desired sample categories caused the interview process to extend through March 1975.

September 4, 1975	Project implementation was further delayed by SCRTD because of concern over federal labor restrictions imposed by Section 13(c) of the National Mass Transportation Act of 1974. One interpretation of this provision would require SCRTD to pay operators' wages for up to six years if the preferential lane project were discontinued at the end of the one-year trial period.
September 1975	Santa Monica City Council officially voted to support the project, ensuring the participation of the Santa Monica Municipal Bus Lines (SMMBL).
October 1975	The Joint Project Board officially rescheduled the implementation date for March 15, 1976 in response to the request of the SCRTD Board of Directors because of difficulties over Item 13c of UMTA Section 5. This date was set to avoid the Christmas holidays and the winter rainy season, which would make motorcycle enforcement of the preferential lanes difficult.
November 1975	A revised evaluation plan was published by SYSTAN, Inc.
December 1975	The computer monitoring the 42-mile surveillance loop was dismanted to permit a move to another location. The computer was not operating again until the early weeks of the project, causing a three-month lapse in recorded freeway data.
	Governor Brown of California signed Assembly Bill 918 into law to become effective January 1, 1976. Although the primary purpose of the bill was to permit vanpooling, it specifically encouraged CALTRANS "to establish, as soon as possible preferential lanes for the use of buses and three-passenger carpools as a pilot project on the Santa Monica Freeway."
January 1976	SCRTD's Board of Directors received a ruling that resolved the dispute over Federal labor restrictions imposed by Section 13c of the National Mass Transportation Act of 1974.

CALTRANS reached an agreement with the Los Angeles Department of Traffic (LADT) concerning the left-turn restrictions at on-ramp entrances and the hours of preferential lane operation. LADT argued to limit the preferential lane operation to peak hours and to the peak direction, as opposed to the planned 24-hour operation in both directions. A compromise calling for 13-hour (6:00 A.M. to 7:00 P.M.) operation in both directions was agreed upon by all participants.

February 6, 1976 — The Joint Project Board revised the hours of preferential lane operation in response to objections raised by members of the Los Angeles City Council. The operating hours were set at 6:00-10:00 A.M. and 3:00-7:00 P.M. in both directions.

March 2, 1976 — The project implementation date of March 15, 1976 was formally verified and publicly announced as the Bounty Board of Supervisors voted unanimously to table the last-minute recommendation by the County administrative offices to delay all new transit projects in an effort to balance the County's financial budget.

March 7, 1976 — CALTRANS began gradual readjustment of ramp metering rates in anticipation of the March 15 implementation date.

March 15, 1976 — The Diamond Lanes opened as scheduled. The first day of operation was disastrous, featuring extreme congestion and delays, meter malfunctions, barricaded off-ramps, and an excessive number of accidents. The day's chaotic events earned the designation of Mad Monday.

Compared to the Diamond Lane operation, new bus services were inaugurated with relatively few hitches. SCRTD initiated seven new express bus routes, three of which served new Park-and-Ride lots. SMMBL initiated one new express route. A total of 70 buses were committed to these new routes and the four existing routes by the two transit companies.

March 29, 1976 — The controversial Normandie barricade was removed and replaced by a metered signal on the transition roadway between the Harbor and Santa Monica Freeways near downtown Los Angeles.

March 29, 1976	A civil suit to stop the State from operating the preferential lanes was filed against CALTRANS by Eric Julber, an attorney living in Santa Monica. He sought a Superior Court injunction claiming that the State had failed to file an Environmental Impact Statement for the project and that the project violated the 5th, 9th and 14th Amendments to the Constitution of the United States.
March 31, 1976	The U.S. Secretary of Transportation, William T. Coleman, visited Los Angeles and publicly urged that the project be given a chance to work and be viewed in a broader perspective.
April 5, 1976	Adriana Gianturco, Director of CALTRANS, called a meeting in Los Angeles and stated that the future of the project was being left open. She deduced to retain the "trial project" for six to eight weeks, after which CALTRANS would "take another hard look at it." Governor Brown endorsed her decision, stating that much more time was needed to adequately evaluate the experiment.
April 8, 1976	City Traffic Engineer S. S. Taylor orders that all on-ramp left-turn restrictions be removed from City streets.
April 9, 1976	A second lawsuit against the preferential lane project was filed by the Pacific Legal Foundation (PLF), a Sacramento-based public interest law firm. PLF filed the suit in U.S. District Court, claiming that the sponsors had failed to prepare environmental impact statements before implementing the project, and that "the public would suffer substantial and irreparable injury unless the project is terminated immediately."
April 14, 1976	Councilman Marvin Braude holds a press conference to call for the following few changes in Diamond Lane operations: 1. Change carpool definition from three persons to two persons. 2. Reduce morning operating hours. 3. Eliminate off-peak direction. 4. Change metering rates.
April 15, 1976	U.S. District Court Judge Matthew Byrne, Jr., citing "serious legal and factual issues," ordered a trial to decide whether the preferential lane project should be stopped in response to

	the PLF suit. The trial data was set for May 4, and the Judge refused to issue a preliminary injunction to stop the project during the interim period.
	SMMBL added four buses to service its Diamond Lane route.
April 19, 1976	SCRTD introduced a new Diamond Lane express route, Line 608 serving Malibu.
	Marketing campaign initiated in the downtown Los Angeles area by CALTRANS and SCRTD in an effort to inform workers in the CBD about the use of buses and the formation of carpools.
April 26, 1976	Vanpool program began.
May 4, 1976	The U.S. District Court trial was rescheduled to begin on June 26, 1976.
May 6, 1976	Adriana Gianturco, Director of CALTRANS, held a press conference to announce a change in the morning hours of Diamond Lane operation. Under the new schedule--implemented on May 17--the Diamond Lanes opened at 6:30 A.M., with restrictions being removed at 9:30 A.M. She expressed general optimism over continued improvement in lane performance and its effect of increasing carpool use and bus ridership, and left the press and public with the message "Give it time."
	Los Angeles Times reports alleged harrassment of City Traffic Engineer S.S. Taylor, reportedly triggered by his opposition to the Diamond Lanes.
May 10, 1976	Service to the Century City Park-and-Ride lot was discontinued for want of sufficient ridership.
May 17, 1977	The change in project operating hours announced on May 6 went into effect.
May 20, 1976	A group of citizens in favor of the Diamond Lanes was formed to promote the use of the Diamond Lanes.
June 1, 1976	After gradual reductions throughout the length of the project, the California Highway Patrol further reduced the number of officers deployed to the project by reassigning officers until deployments approached pre-project levels.

June 3, 1976	License plates of Diamond Lane users are recorded for further use in a survey of corridor drivers.
	Drivers opposed to the Diamond Lanes stage a mock funeral procession in the Lanes to protest their existence. The distraction resulting from this demonstration was listed as a contributing factor in at least two accidents.
June 8, 1976	Los Angeles County voters defeated a proposal on the June ballot to authorize the construction of a rail rapid transit system by 60% to 40%.
June 15, 1976	To take advantage of the Santa Monica Freeway, CALTRANS officials opened the first of sixty Park N' Pool lots, where carpoolers could meet before riding to work together. The first lot was donated by the California National Guard and was located just south of Wilshire Boulevard in West Los Angeles.
	Los Angeles City Councilman Marvin Braude called a press conference to announce the first public hearings on the Diamond Lane project, held on Monday evening, June 21st. The Councilman warned that if CALTRANS could not produce "concrete reasons" to support the Diamond Lanes, he would take action to end them.
	Adriana Gianturco, Director of CALTRANS, attended the Los Angeles County Board of Supervisors meeting. She argued for the continuation of the controversial project, describing it as the Los Angeles area's "most sensible, flexible" transportation alternative. A majority of the Supervisors agreed with her, defeating a motion by Supervisor Kenneth Hahn to request that Governor Brown halt the Diamond Lane project immediately.
June 21, 1976	Approximately 250 people attended the first public hearing on the Diamond Lane project. The hearings, chaired by City Councilman Marvin Braude, began with panelists presenting their arguments for and against the project. These panelists included CALTRANS officials and the City Traffic Engineer, and were followed by citizens expressing their opinions.

June 22, 1976	The Automobile Club of Southern California urged the State to abandon the Diamond Lane experiment. The organization's Board of Directors, representing two million members, sent a letter to Adriana Gianturco stating that it had "serious concerns" about the reduced mobility, safety, and freeway capacity caused by the preferential lanes.
June 27, 1976	SCRTD introduces route changes on Line 606 along Culber Boulevard and Line 607 serving the airport.
June 28, 1976	S.S. (Sam) Taylor, City Traffic Engineer, held a press conference announcing that the Diamond Lanes increased traffic volumes on City streets in the corridor, causing a 26% increase in overall travel times, and that the number of accidents had increased from 1975. He released a report on his findings, and stated that people were trying to impeach and discredit him because he was against the Diamond Lane project.
	Meeting in a special session, SCRTD directors authorized fare increases in response to a reduced revenue-subsidy from the County Board of Supervisors. The proposed fare increases, which included a 10¢ surcharged for patrons riding buses on the Santa Monica and San Bernardino Freeways' preferential lanes, as well as other increases affecting Diamond Lane patrons, were scheduled to take effect on July 1.
June 30, 1976	SCRTD conducted an on-board survey of riders on its project lines during both the morning and evening horus. Of the 1,260 questionnaire forms distributed, approximately 88% were answered.
	The U.S. District Court trial to decide whether or not the Diamond Lane project followed the environmental laws under CEQA and NEPA commenced with Judge Matthew Byrne presiding. The trial was being held in response to a suit by the Pacific Legal Foundation (PLF), a Sacramento-based public interest law firm. PLF claimed that CALTRANS failed to file an environmental impact statement, and that the Diamond Lanes had caused increased air pollution and energy consumption.
July 7, 1976	SCRTD Line 603 serving Century City was discontinued due to lack of ridership.

July 22, 1976 — The Los Angeles Times reported that the San Diego Freeway Diamond Lane project, tentatively scheduled to open in September, would be delayed. The State Secretary of Business and Transportation, Donald Burns, was quoted as saying, "The opening is up in the air." Three problem areas were cited: the controversy over the Santa Monica Freeway project; the poor performance of RTD buses on a steep hill section of the freeway during a test run; and the negative attitude of several key public officials displayed at a recent advisory committee meeting for the project.

August 3, 1976 — State Senator Cusanovich introduced to the State Transportation Committee a bill similar to Assembly Bill 4525. The Senate also asked that any other preferential lane projects be approved by the California State Legislature before being established. By a 5 to 1 Committee vote, the Senate Bill was passed on for full Senate consideration.

Following 1-1/2 hours of debate, the Los Angeles City Council voted 10 to 4 to ask the State Department of Transportation to terminate the Santa Monica Freeway project. A similar action was taken by the Culver City City Council on July 28. However, neither of the votes had legal standing.

August 4, 1976 — The State Assembly Transportation Committee voted 7 to 7 (8 votes were required to pass the measure) on Assembly Bill 4525, which would repeal CALTRANS' authority to run the Santa Monica Freeway experiment.

August 9, 1976 — Judge Byrne, after hearing final arguments on Friday, August 6 from the opposing sides in the Santa Monica Freeway Diamond Lane trial, ruled that an environmental impact report (EIR) must be filed under both federal and State environmental laws. The Diamond Lanes were to be returned to pre-project status by Friday, August 13. CALTRANS was given 180 days from this data to file the required EIR.

August 10, 1976 — In response to the public announcement that the CHP would not enforce Diamond Lane restrictions during the last week of the project, motorists poured into the reserved lane, effectively ending the Diamond Lane demonstration in advance of the official August 13 termination date.

August 12, 1976	Santa Monica Municipal Bus Lines (SMMBL), after experiencing difficulties in executing their on-board survey, scheduled the survey for Tuesday, August 10. When Judge Byrne's decision to halt the Diamond Lane project was announced, SMMBL rescheduled its survey date to Thursday, August 12.
August 13, 1976	Official project termination date.
August 23, 1976	SCRTD drivers strike, shutting down system operation in response to a disagreement between the United Transportation Union and the SCRTD board over a proposed three-year salary package.
September 28, 1976	SCRTD resumes operations following a 36-day shutdown during strike negotiations. Park-and-Ride lot operations are shut down following the strike, and Santa Monica Freeway bus service is reduced by 20 buses.
October 19, 1976	Two days prior to the 60-day limit for contesting a federal court ruling, both CALTRANS and UMTA filed notice of their intent to appeal the decision of U.S. District Court Judge Matthew Byrne. The notice did not commit either of the two agencies to follow through with the challenge, but did keep the case within the court's jurisdiction.
January 29, 1977	After considerable controversy and delay, the newly-widened San Diego Freeway is opened for general use. This lane was originally intended as a preferential lane for high-occupancy vehicles, but citizen opposition stemming from the Santa Monica Freeway experience prevailed and the new lane was opened to all drivers.

2.7 CURRENT STATUS

The August 9 ruling of Judge Matthew Byrne appears to have had the effect of ending the Santa Monica Freeway Diamond Lane demonstration. It seems unlikely that the project will be resumed, regardless of the outcome of the pending appeal. Furthermore, as evidenced by the reversal of CALTRANS' plans to open a preferential lane on the San Diego Freeway, the operational drawbacks and controversy characterizing the Santa Monica Freeway project may have threatened the ability to proceed with the entire preferential treatment program developed in response to the EPA's proposed transportation controls.

2.8 PROJECT FUNDING AND SOURCES

The total identifiable costs incurred by public and private agencies for the Diamond Lane project is estimated to be $3,127,019. This total is composed of approximately $170,000 for capital expenditures on the freeway system and $2,957,019 for operating expenses incurred by all participating agencies. A breakdown of the total cost, presenting uses of funds and their sources, is shown in Table 2.1. The largest outlay spent by a single organization was $1,220,529 spent by SCRTD. The majority of this money came from County funds and was spent on bus operations ($950,000). SMMBL also spent the largest part of its funds on bus operations ($150,000 out of a total expenditure of $173,571).

CALTRANS' costs have accumulated since December 1973, when the project planning began; its total cost ($1,208,241) includes court trial costs and costs for post-project data collection. A major part of CALTRANS' funds went to data collection during the project ($729,779). Slightly one-half of the money came from UMTA funds; State funds provided the remainder.

LADT costs reflect expenses from July 1975 through September 1976. A major portion of this money was spent for administration ($58,060). The Department stresses that these figures only represent retrievable costs; furthermore, the data collection figure ($7,420) does not include expenses from March 13 to May 17 and from May 22 to September 17, 1976. A rough estimate of an additional $10,000 spent during these periods has been posited. LADT has requested $33,040 from SCAG to help cover costs.

Grants from the federal government funding the project came from two agencies: UMTA and FHWA. UMTA gave $1,118,913 (35.8% of the total project cost), divided among CALTRANS, SCRTD, SMMBL, Market Facts, and SYSTAN, Inc. FHWA provided Market Facts with $127,000 (7.3% of total project costs). Thus, federal monies covered 40% of all project costs.

TABLE 2.1: SUMMARY OF FUNDING SOURCES (IN DOLLARS)

	AGENCY FUNDED										FUNDING SOURCE					
	CALTRANS		SCRTD		SMMLB		LADT		Market Facts	SYSTAN INC.	Total UMTA	Total FHWA	Total State	Total County*	Total LADT	TOTAL
	UMTA	State	UMTA	County	UMTA	County	SCAG	City	FHWA/UMTA	UMTA/TSC						
Project Evaluation										219,228	219,228					219,228
Data Collection Review	375,750	354,029	39,977		1,097			7,420*	227,000		516,824	127,000	354,029		7,420	1,005,273
Marketing & Public Information	163,650	50,456	73,711	60,000	10,254		33,040 requested				247,615		50,456	60,000		358,071
Signs & Painting		150,000						12,970					150,000		12,970	162,970
Local Agency Admin.	26,185		96,841		12,220			58,060			135,246				58,060	193,306
Court Costs		55,462		minor		minor							55,462			55,462
Compliance w/Court Orders		20,000											20,000			20,000
Bus Operations				950,000		150,000								1,100,000		1,100,000
Post project Data Collection		12,709											12,709			12,709
TOTAL	1,208,241		1,220,529		173,571		78,450		227,000	219,228	1,118,913	127,000	642,656	1,160,000	78,450	3,127,019

* See text

3.0 SITE OVERVIEW

This section contains a brief description of the Los Angeles area primarily affected by the Diamond Lane project. This area, designated as the Westside study area, is a fully-developed urban region in West Central Los Angeles County. Exhibit 3.1 contains a map of the region affected by the project, with a dark line around the area of primary impact. A full description of the physical characteristics, population density, income distribution, land use patterns, employment patterns, and transportation network in this study area may be found in the Grant Application prepared by SCRTD.[3] The overview presented in this section focuses on those elements of the West Los Angeles setting of primary interest from the evaluator's standpoint. General demographic characteristics are presented, and specific features of the setting having a direct bearing on the Diamond Lane project, such as the sprawling nature of Los Angeles and the related freeway culture, are identified.

3.1 SITE CHARACTERISTICS

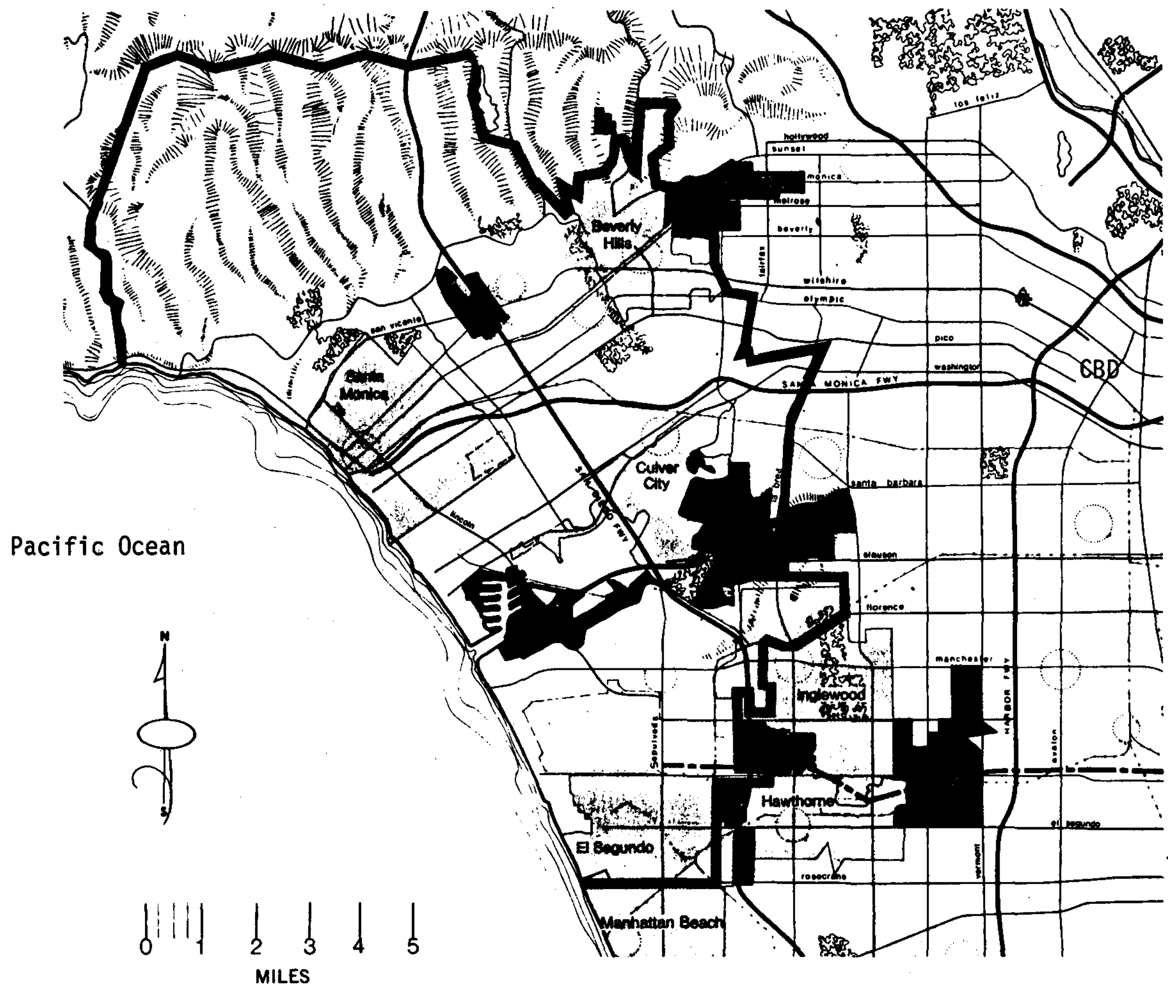
3.1.1 Geographic and Community Boundaries

The Westside study area depicted in Exhibit 3.1 is bounded by La Cienega Boulevard on the east, the Pacific Ocean on the west, the Los Angeles International Airport on the south, and the Santa Monica Mountains on the north. The six cities of Los Angeles, Santa Monica, Culver City, Beverly Hills, El Segundo, and Inglewood are either wholly or partly within the area, as are significant unincorporated County areas. Also important are some nineteen definitive community districts encompassed by the project area:

Community	Legal Status
Bel Air	City of Los Angeles
Brentwood	City of Los Angeles
Century City	City of Los Angeles
Cheviot Hills	City of Los Angeles
Fox Hills	City of Culver City
Ladera Heights	Unincorporated
Mar Vista	City of Los Angeles
Marina del Rey	Unincorporated
Pacific Palisades	City of Los Angeles
Palms	City of Los Angeles
Playa del Rey	City of Los Angeles
Rancho Park	City of Los Angeles
Venice	City of Los Angeles

EXHIBIT 3.1

PROJECT AREA



Cities

L.A. County

L.A. City

Source: Project Grant Application.

Community	Legal Status
View Park	Unincorporated
West Hollywood	Unincorporated
West Los Angeles	City of Los Angeles
Westchester	City of Los Angeles
Westwood	City of Los Angeles

The location of these communities is indicated in Exhibit 3.2.

The resulting total area of the Westside study area is approximately 99.6 square miles. With the exception of the Santa Monica Mountains on the north and the Baldwin Hills on the east, the land contained in the project area is a flat coastal plain, gently rising from sea level at the beach to around 200 feet above sea level at the eastern extremity of the area. This land was at one time a highly productive agricultural area; however, it has long since been entirely developed into residential and commercial use.

The project area as defined is approximately six and one-half miles wide from east to west and 11 miles long from north to south. From the pier in Santa Monica, it is 14 miles to the heart of downtown Los Angeles. The easternmost point in the service area at Fairfax Avenue and the Santa Monica Freeway is seven miles from the Los Angeles central business district (LA CBD). Beverly Hills and Westwood are located approximately two and one-half miles north of the Santa Monica Freeway. The LA CBD is about nine miles from Beverly Hills via the Santa Monica Freeway and about 11 miles from Westwood. From El Segundo, the furthest point south in the project area, it is approximately 17 miles to downtown Los Angeles.

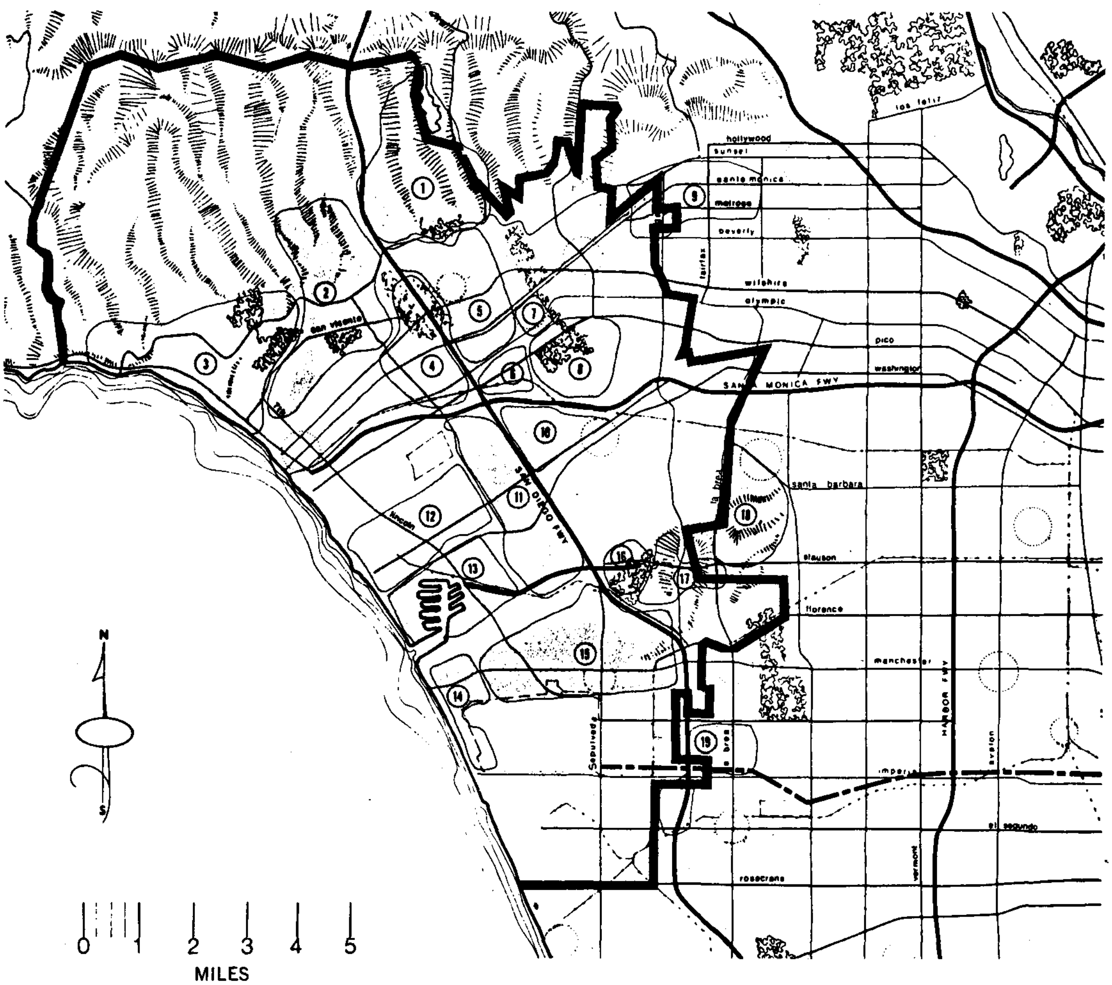
Clearly, the implications of the Diamond Lane project extended beyond the study area delineated in Exhibit 3.1. Many users of the Santa Monica Freeway came from points well removed from the study area, and the controversy surrounding the Diamond Lane project has affected transportation decisions throughout Los Angeles and the remainder of the State and country. The boundaries shown in Exhibit 3.1, however, roughly delineate the area served by the Diamond Lane buses, and provide a basis for comparison for other areas considering preferential lane service.

3.1.2 Population and Population Density

In 1970, the U.S. Census enumerated the resident population of the Westside study area at approximately 616,000 persons. On that basis, the density of the inhabited area is estimated to be 6,185 persons per square mile. Within the study area, population densities may vary markedly above and below this average figure. Population densities are quite low in several major non-residential portions of the study area. These include the Baldwin Hills oil fields, the Standard Oil Refinery/El Segundo industrial area, Los Angeles International Airport, and the Hughes Airport industrial area.

EXHIBIT 3.2

D.2.d. COMMUNITIES



1. Bel Air
2. Brentwood
3. Pacific Palisades
4. West Los Angeles
5. Westwood
6. Rancho Park
7. Century City
8. Cheviot Hills
9. West Hollywood
10. Palms
11. Mar Vista
12. Venice
13. Marina Del Rey
14. Playa Del Rey
15. Westchester
16. Fox Hills
17. Ladera Heights
18. View Park
19. Lennox

(Source: Project Grant Application)

At the other extreme, a number of communities within the Westside study area have population densities well above average. A few of these cities are identified below.

POPULATION DENSITIES OF SELECTED WESTSIDE STUDY AREA CITIES AND COMMUNITIES

	Square Miles of Area	Persons per Square Mile
City of Santa Monica	8.3	10,637
City of Inglewood	8.9	10,111
Culver City	4.8	6,466
Westwood (Los Angeles)	3.9	8,588
Palms/Mar Vista (Los Angeles)	8.0	11,844
West Los Angeles/Rancho Park (Los Angeles)	7.1	9,282
Venice (Los Angeles)	3.2	11,380

Sources: 1970 U.S. Census of Population and Housing, and 1970 U.S. Census of Population, Vol. I, Part A, Section 1, pp. 1-124 through 1-127, as assembled by SCRTD in Reference 3.

3.1.3 Income Levels

The average family income for residents of the Westside study area was reported as $12,406 by the 1970 Census. Significant shifts above and below this figure may be found in different communities within the study area. The Westside communities reporting the highest income levels are Brentwood, Pacific Palisades, Beverly Hills, Marina del Rey, Playa del Rey, and Fox Hills. In almost all sections of these high-income areas, the median family income is in excess of $20,000 per year. The highest income area is Brentwood, where the median family income is $37,400 per year. In this community, 73 percent of the families reported incomes in excess of $25,000 per year in 1970.

The communities of Westwood, West Los Angeles, Cheviot Hills, Ladera Heights, View Park, Santa Monica, Playa del Rey and Westchester are inhabited by persons who had family incomes between $8,000 and $15,000 per year in 1970. These middle and upper-middle class families live in tract homes and well-kept apartment buildings. A student subculture is clustered around the west edge of the UCLA campus in Westwood and scattered throughout the Westside study area.

Although housing costs have risen rapidly in the Westside area in recent years, a number of communities are characterized by the Grant Application as containing moderate and medium income residents. These include Culver City, Palms, Mar Vista, Inglewood, and El Segundo, all of which reported average household incomes under $12,000 in 1970.

Pockets of lower income households exist throughout the Westside area, but the most significant concentration is in Venice. Characterized by the Grant Application as being "somewhat Bohemian in its flavor," Venice is "....comprised of household types ranging from high-rise condominiums (Ocean Park Redevelopment Project) to student beach bungalows and dilapidated 'motor court' shanties."[3] The Oakwood section, with a median family income of $5,000 in 1970, is Venice's most economically depressed area.

3.1.4 Land Use and Employment

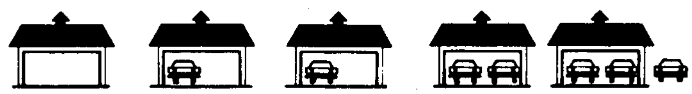
The primary use of land in the Westside area is residential, with much strip commercial development lining the main traffic arteries. A number of banking, finance, insurance and other professional services are located in high-rise office and hotel complexes in Westwood, Beverly Hills, Century City, Los Angeles International Airport, Santa Monica, and Marina del Rey. The principal industrial centers are located in the southern portions of Santa Monica and Culver City, and border El Segundo on the south and east.

A substantial portion of the people who live in the Westside area also work there. Given the spread of employment possibilities throughout the City, relatively few Westside residents work in the LA CBD, the focal point of the Diamond Lane bus services. In all, the 1970 Census shows 8,981 Westside workers employed in the Los Angeles CBD. These workers, constituting 3.3% of the Westside work force, make up the primary market for the Diamond Lane express bus service. In tracing the location of CBD workers within the study area, the Project Grant Application identified three clusters of census tracts harboring a high incidence of these workers:

> "The largest cluster is located in the northeastern portion of the service area and includes the southern portion of Beverly Hills, Century City, Cheviot Hills (located just southeast of Beverly Hills), and the eastern portion of Rancho Park. Another cluster with a high incidence of LA CBD workers includes the communities of Marina Del Rey and Fox Hills. Another, less defined area of LA CBD workers is grouped along both sides of the Santa Monica Freeway from Robertson (Cheviot Hills) eastward to the project area boundary at La Brea. In all of these clusters, over six percent of the workers are LA CBD employees. The tracts with a high incidence of LA CBD workers also contain persons of above average or high incomes."[3]

EXHIBIT 3.3

AUTO OWNERSHIP IN U.S. AND LOS ANGELES



	PERCENT OF HOUSEHOLD OWNING				
	No Car	One or More Cars	One Car	Two Cars	Three or More Cars
ALL US HOUSEHOLDS........	20.5%	79.5%	49.3%	24.6%	5.6%
ALL LOS ANGELES SMSA HOUSEHOLDS.............	15.1%	84.9%	44.0%	33.3%	7.6%
WESTSIDE STUDY AREA HOUSEHOLDS............	13.2%	86.8%	46.6%	32.7%	7.5%

Source: 1. 1973/74 Automobile Facts and Figures, Motor Vehicle Manufacturers Association of the U.S., Inc., Detroit, Michigan.

2. 1970 U.S. Census of Housing: Housing Characteristics for States, Cities and Counties; Volume I, California, U.S. Bureau of the Census, Washington, D.C.

3.1.5 Automobile Ownership

Automobile ownership statistics for the Westside study area are shown in Exhibit 3.3. The 1970 Census shows that 86.8% of all households in the Westside study area have one or more cars. This percentage is higher than both the 84.9% figure for the entire Los Angeles SMSA and the 79.5% figure characterizing the U.S. as a whole.

3.1.6 Modal Shares

Transit service for the Westside area is provided by the Southern California Rapid Transit District (SCRTD), Santa Monica Municipal Bus Lines (SMMBL), and Culver City Municipal Bus Lines (CCMBL). According to the 1970 Census journey-to-work data, 14,435 of the 274,947 workers who live in the project area regularly use the bus as their means of transportation to work. This computes to a 5.25 percent modal split for buses. Almost all of the remaining workers used a private automobile, either as a driver or passenger, to travel to work. A total of 76.8 percent of all Westside commuters reported that they drove to work, while an additional 7.8 percent reported commuting as auto passengers. For the City of Los Angeles as a whole, 9.0 percent of the persons making work trips regularly use the bus, and 5.4 percent of the workers for the entire County use the bus.

A survey of LA CBD employees conducted by Wilbur Smith[4] in December 1974 and January 1975 estimated the total number of CBD employees at that time to be 180,745. Of these, 8,724 were found to live in an area roughly (but not exactly) comparable to the Westside study area shown in Exhibit 3.1. Sixteen percent of these CBD workers commuted by bus from the Westside area, while 71 percent drove autos, 6 percent were auto passengers, and the remaining 7 percent reported other means of commuting.

3.1.7 Typical Corridor Trips and Travelers

As part of the evaluation, a license plate-based survey was mailed to a broad sampling of carpoolers, non-carpooling freeway users, and surface street drivers in the Santa Monica Freeway corridor during the Diamond Lane operating hours. This corridor user survey provides a wealth of information on travel behavior before, during and after the Diamond Lane project; public attitudes and comments; and the demographic characteristics of the drivers. Most of this information and the resulting statistical inferences are interwoven throughout Section 5 of this report. Information on typical corridor trips and travelers during the peak period is summarized below.

3.1.7.1 Typical Corridor Trips - Sixty-seven percent of the corridor drivers surveyed reported that the main purpose of their trip was work-related, while 25% reported that they drove in the corridor for school or shopping trips. Seventy-five percent said they made the trip at least four times per week, and only 28.5% reported that they were aware of a public transit service that might have been used for their trip.

The majority (70%) of the drivers responding did not pay a parking fee at the end of their trip. The average daily parking cost for those who did was $1.14. According to the survey responses, the average rush-hour trip was 21 miles long and took 37 minutes in the morning and 43 minutes in the evening. The effective trip speeds implied by the reported travel times and trip lengths was 33.6 miles per hour during the morning peak and 29.5 miles per hour during the evening peak. These estimates indicate that travel was slightly slower in the evening, which is consistent with the fact that corridor traffic volumes are greater in the evening. Trip lengths for freeway users averaged 6.5 miles longer than city street users, and carpool trip lengths averaged three miles longer than trip lengths of single-occupant drivers.

3.1.7.2 <u>Typical Corridor Trip-Makers</u> - The Santa Monica Freeway corridor user survey provides some key demographic statistics to construct a traveler profile. Approximately one-third of the respondents were female, and 25% of both males and females fell into the 18-29 age group, 37% were between 30 and 44 years of age, and 34% were between the ages of 45 and 65. The annual household incomes reported by these respondents were moderately high, with 56% earning $20,000 or more and 9% earning below $10,000. Half of these households owned two or more automobiles, and 54% had at least two licensed drivers in the household. The distribution over the type of cars was quite dispersed:

Type of Car	Percent of Drivers
Compact	32
Standard	31
Subcompact	13
Sports	10
Luxury	8
Station wagon	4
Other	2

Based on these results, the typical peak-hour trip-maker was a 40-year-old male and the head of a household earning over $20,000, with two cars and two licensed drivers in his household.

3.2 HIGHLIGHTS OF THE SETTING

There are several unique features of the Los Angeles demonstration site that are likely to have an impact on the transferability of results to other urban areas. A few of these features are described below:

Geographic Sprawl. Because of the scattering of trip origins and destinations throughout Los Angeles, relatively few users of the Santa Monica Freeway are destined for the CBD. The lack of a focal point for trip destinations made carpool formation relatively difficult and decreased the pool of potential riders of the CBD-directed bus service. In practice, the scattering of origins and destinations also meant that drivers were likely to want to enter and leave the Diamond Lanes at points all along their 12.5 mile length. The operation of such a lane proved to be considerably more complex than it might have if most drivers had been headed for a common destination.

Automobile Dependence and the Mystique of the Auto. As a result of the geographic sprawl of the City, Los Angeles residents generally travel further and are more dependent on their autos than residents of other U.S. cities. The freeways are the City's lifelines, and it is a local observation that the combination of freeways and sprawl means that "you can get everywhere in forty-five minutes, but you can't get anywhere in less than thirty minutes." This dependence on the automobile and the freeway network helps to generate a special breed of driver. It is difficult to define this breed quantitatively for evaluation purposes. However, most of the national press reports on the Diamond Lanes alluded to the special qualities of the Los Angeles drivers, whether they were characterized as "auto-happy Californians' (Time Magazine), "maverick commuters" (California Magazine), "fiercely independent Angelinos" (California Magazine). or creatures of the "California Car Culture" (New West Magazine). The Wall Street Journal (May 5, 1976) noted that "compounding the traffic jams is the average Angelino's tendency to whiz along in solo splendor; the right to the privacy of one's car has long been cherished here."

Joan Didion, writing for Esquire Magazine (August 1976), produced perhaps the most lucid literary expression of the near-mystical bond between the Los Angeles driver and his automobile:

> "To understand what was going on it is perhaps necessary to have participated in the freeway experience, which is the only secular communion Los Angeles has. Mere driving on the freeway is in no way the same as participating in it. Anyone can drive on the freeway, and many people with no vocation for it do, hesitating here and resisting there, losing the rhythm of the lane change, thinking about where they came from and where they are going. Actual participants think only about where they are. Actual participation requires a total surrender, a concentration so intense as to

> seem a kind of narcosis, a rapture-of-the-freeway. The mind goes clean. The rhythm takes over."

Attempts to quantify this view of the freeway and its drivers as a "regional mystery" are doomed to failure. However, the view needs to be appreciated by anyone attempting to translate the results of the Santa Monica Diamond Lane demonstration.

High Incomes and Automobile Ownership. As noted, the 1970 Census shows that 17.2% of all Los Angeles households have no car, compared to an average of 20.5% in all U.S. metropolitan areas. This difference is even more pronounced in the Westside study area, which contains some of the highest income areas in the United States. The highest income area is Brentwood, where the median family income is $37,400 per year, but Pacific Palisades, Beverly Hills, Marina del Rey, Playa del Rey, and Fox Hills all rank as areas with exceptionally high incomes per capita. Thus, most residents of the study area have a ready alternative to transit use. Their dependence on the automobile, however, could be expected to foster resentment toward any project which limits the perceived freedom of automobile usage, and the political importance of the wealthy neighborhoods helps to guarantee a hearing for that resentment.

Los Angeles Climate. The temperate Southern California climate, which is not duplicated in many other U.S. cities, is another factor to be addressed in considering the transferability of results. Accompanying this climate are unusually high smog levels, and a consequent local awareness and appreciation of the need for air quality control.

4. EVALUATION OVERVIEW

This section provides an overview of the demonstration evaluation. Prior to the project and in the early stages of the Diamond Lane demonstration, the evaluation generally followed the detailed plan developed by SYSTAN, Inc. in November 1975.[1] Certain deviations occurred prior to the project that reflected the shifting of project responsibilities and manpower shortages within CALTRANS. As the demonstration progressed, additional adjustments in the basic evaluation plan were made to focus on questions of interest, make the best use of available manpower, respond to the need for operational decisions and public information, and capture perishable data as a hedge against the possibility that the project might be closed without warning. The sudden closing of the project in August interrupted the evaluation in midstream and necessitated a number of significant changes in the structure of the evaluation plan. This section outlines the contents of the original plan, traces the steps in its implementation, and addresses the implications of the demonstration's sudden closing on the evaluation findings.

4.1 GENERAL EVALUATION STRATEGY

4.1.1 Overview of the Evaluation Plan

Prior to the demonstration, SYSTAN, Inc. prepared an evaluation plan[1] designed to address the key issues surrounding the demonstration and to provide a quantitative assessment of the ability of the demonstration to meet the stated objectives. The plan described the variables that best characterized these objectives, identified factors which might mitigate or amplify the anticipated demonstration impacts, specified the instruments to be used in collecting data, described the populations to be measured, identified statistical tests and analytic procedures, scheduled measurement and analysis activities to coincide with demonstration activities, described potential threats to the validity of demonstration findings, and suggested methods for increasing the transferability of results to other areas.

Relationships between variables, control activities, measurement strategies, and analytic procedures were expressed through the medium of an experimental design that attempted to:

- Measure the existence and magnitude of changes in such attributes as traffic congestion, vehicle occupancy, vehicle speeds, transit ridership, air quality, and accident levels;
- Identify the extent of the changes attributable to the Diamond Lane demonstration; and

- Identify those characteristics or factors (police enforcement, public attitudes, etc.) that reinforce or mitigate the changes.

Exhibit 4.1 presents a graphic overview of the evaluation process. This exhibit shows each of the major categories of data to be sought, itemizes the major data elements within each category, depicts the data collection instruments to be employed, and specifies certain of the critical comparisons to be made in analyzing the collected data. The major categories of data sought in the demonstration evaluation were classified as follows:

- Traffic Data;
- Transit Data;
- Safety and Enforcement Data;
- Air Quality Data; and
- Attitude and Behavior Data.

Findings in each of these major categories are itemized in each of the subsequent chapters of this report.

The evaluation plan relied on a variety of different data sources, including manual observations, computerized traffic surveillance, mechanical traffic counters, air bag samples, police reports, bus operating records, home interviews, on-board surveys, and license plate-based postcard surveys. The precise uses of the data acquired from these sources were described in detail in the plan itself and are documented in subsequent chapters of this evaluation report.

Certain of the bus routes and one freeway in the study area that were not likely to be affected by the preferential lane demonstration were designated as control routes to provide a basis for analytic comparisons. These comparisons were combined with "before," "during," and "after" measurements in identifying system changes. Control routes for the Santa Monica Freeway project included the #11 route of SMMBL, the #34 and #36 of SCRTD, and the Long Beach Freeway south of the Los Angeles CBD.

4.1.2 Overview of the Data Collection Process

The evaluation plan identified the data elements needed to evaluate the key issues surrounding the Diamond Lane demonstration and specified the location, timing, and sample size of the measurement process. Exhibit 4.2 maps the geographic location of the major data collection activities. The measurement activities associated with each major category of data are listed briefly below. In Appendix H, matrices relate these measurement activities to the various data elements required in the evaluation. Samples of the forms used to collect traffic and transit data appear in Appendix B, while samples of survey forms appear in Appendix A. A detailed specification of data collection activities may be found in SYSTAN's evaluation plan.

EXHIBIT 4.1: OVERVIEW OF THE EVALUATION PROCESS

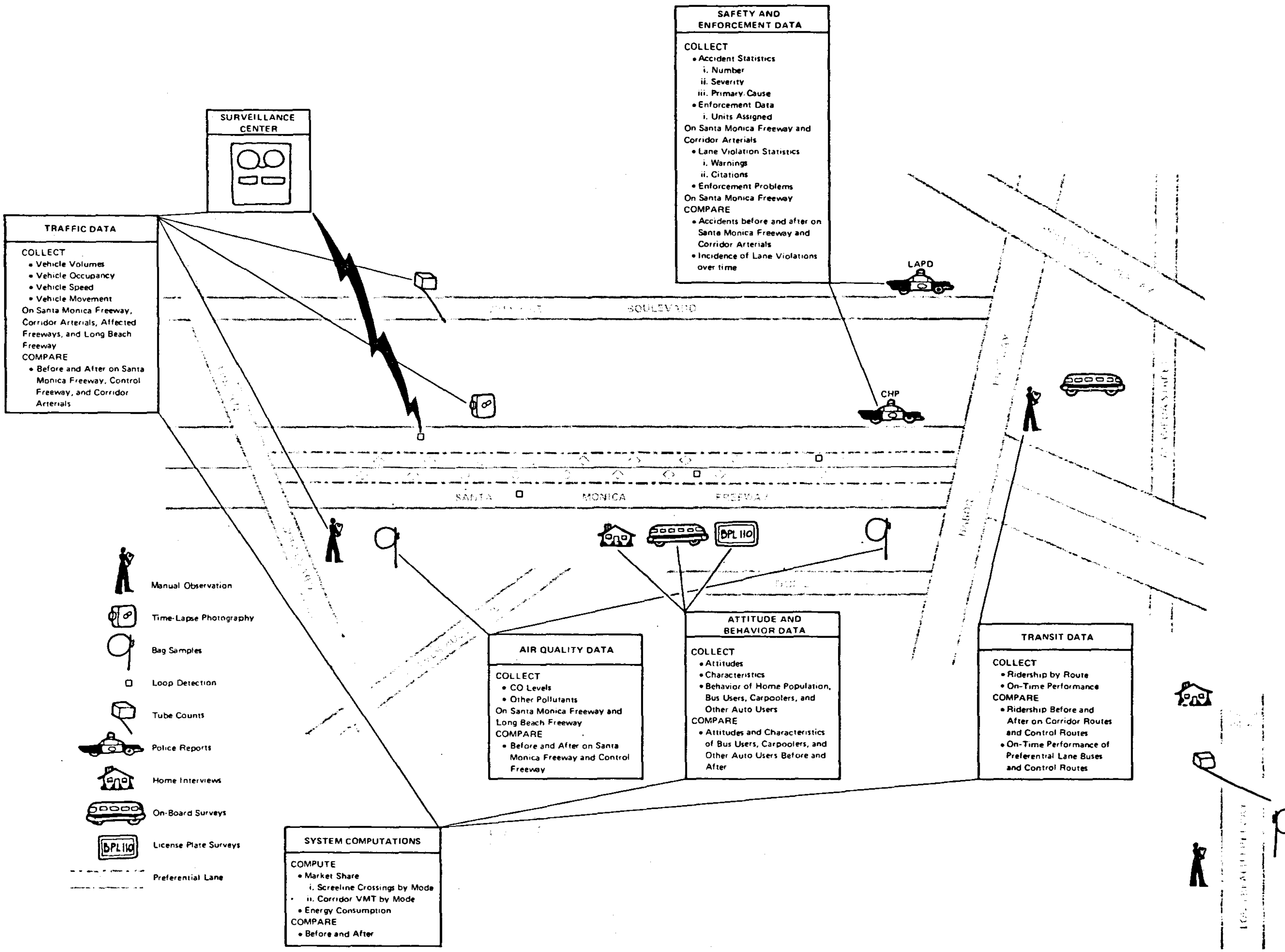
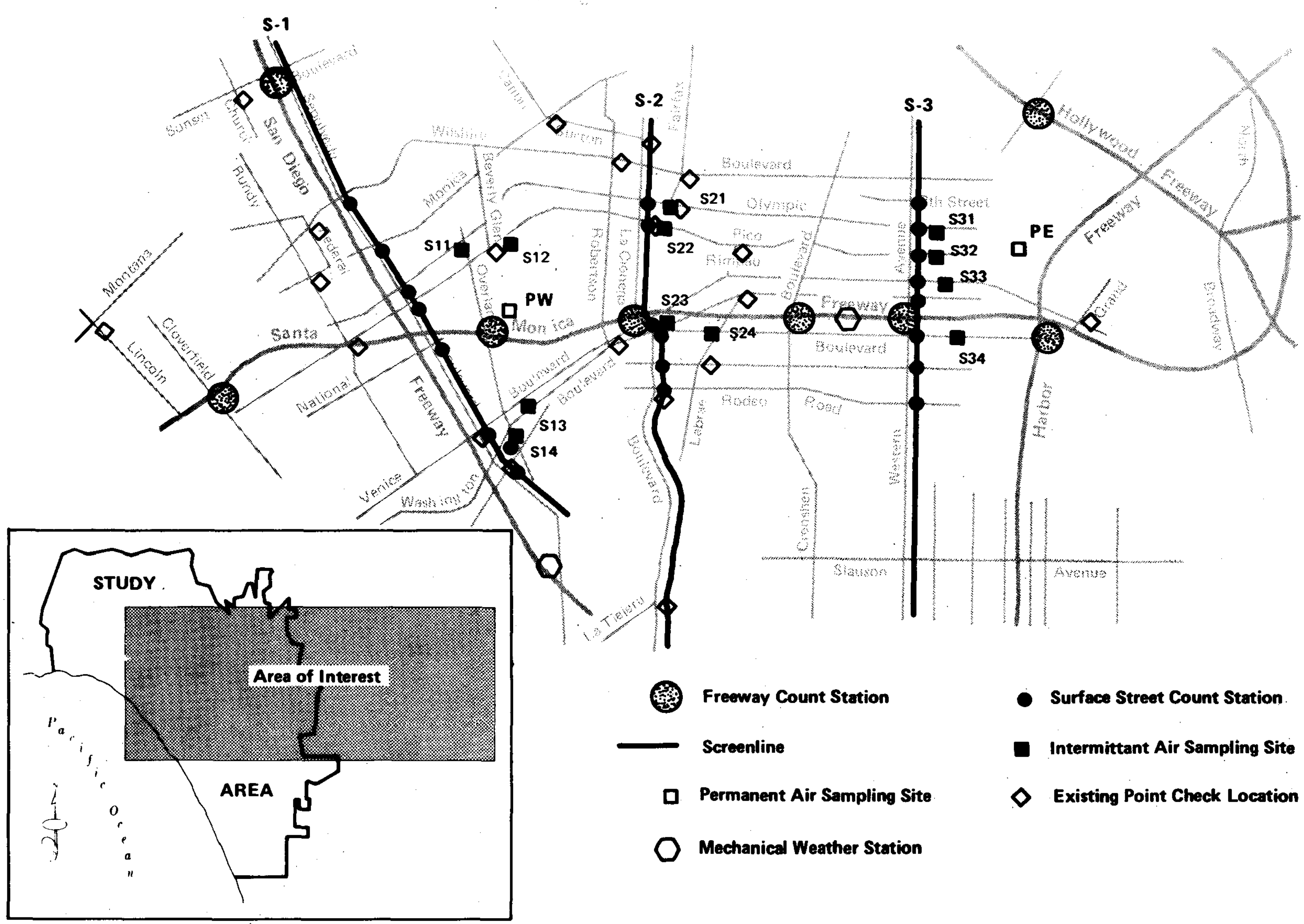


EXHIBIT 4.2

SANTA MONICA FREEWAY CORRIDOR DATA COLLECTION PLAN



4.1.2.1 Traffic Data - A variety of traffic data was collected on the Santa Monica Freeway, parallel surface streets,* and control freeways before, during, and after the Diamond Lane demonstration. For this purpose, three screenlines were established along the Santa Monica corridor, at Sepulveda Boulevard (S-1 in Exhibit 4.2), La Cienega Boulevard (S-2), and Western Avenue (S-3). As the demonstration progressed, most evaluation activities focused on the Western Avenue screenline, the screenline nearest the Los Angeles CBD.

Types of traffic data assembled during the evaluation included:

- Vehicle volume counts (manual and tube counts at screenlines);
- Vehicle occupancy counts (manual counts at screenlines);
- Speed runs (made with vehicles carrying recording tachometers between Lincoln and Grand);
- Measurements of on-ramp queue lengths and waiting times (taken manually for each on-ramp);
- Time lapse photography (Santa Monica Freeway, Western Avenue screenlines only)
- Aerial photography; and
- Computerized traffic flow records (reflecting vehicle volumes and estimated speeds at different surveillance stations).

4.1.2.2 Transit Patronage and Performance Data - Patronage on all Diamond Lane Express routes was monitored at least weekly by counters stationed at Venice and Grand in the Los Angeles CBD. Patronage on routes existing before the demonstration was documented by point checks made before and during project implementation at selected points along the routes (see Exhibit 4.2). Checkers monitoring ridership also monitored on-time performance.

4.1.2.3 Safety and Enforcement Data - Accident statistics for the Santa Monica Freeway and for surface streets in the corridor were assembled on a daily basis and recorded by number, severity (property damage, injury, or fatality), location (lane and mileage marker or intersection), time of day, direction, and primary cause. Detailed police reports on each freeway accident occurring during the Diamond Lane demonstration were obtained and organized by CALTRANS.

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*Performance data were collected for the following surface routes between Lincoln Avenue in Santa Monica and Grand Avenue in the Los Angeles CBD: Olympic, Pico, Venice, Washington, Culver to Washington to Adams, and Jefferson to Rodeo to Exposition.

The number of California Highway Patrol (CHP) officers deployed within the limits of the project was recorded on a daily basis before, during, and after the demonstration. The number of warnings and citations issued to violators of the Diamond Lanes or of access ramp bypasses was also recorded daily, as were the number of tickets issued for other causes during Diamond Lane operating hours. A separate tally of Diamond Lane violators was compiled by the observers making vehicle occupancy counts at each screenline.

4.1.2.4 Air Quality Data - Changes in carbon monoxide (CO) emissions were measured by CO samplers placed on the freeway itself and on adjacent city streets. Two permanent bag samplers were set up, one near the west end and one near the east end of the project. In addition, twelve intermittant air sampling sites were established, with four on each of the three project screenlines. To help interpret air quality measurements, weather conditions were recorded at two mechanical stations located in the study area. The locations of air sampling devices and weather stations are plotted in Exhibit 4.2.

4.1.2.5 Attitudes, Behavior, and Public Reaction - Because the Santa Monica Freeway project was the first of the scheduled preferential lane projects to be implemented, and because it entailed the denial of an existing lane to most drivers, it was clear in advance that the Diamond Lanes could be expected to generate a good deal of public reaction. Although the full range of the vehemence and extent of the reaction was not anticipated, the evaluation plan contained provisions for monitoring both personal attitudes and public response. A variety of surveys was conducted, media reports were monitored, several forums were provided for the expression of public opinion, and the events of the District Court trial were followed in the course of the evaluation process. These activities are described briefly below:

Attitude and Behavior Surveys. Three separate surveys were planned and executed as part of the independent evaluation process:

1. A "before and after" home interview survey was conducted by the FHWA through its consultant, Market Facts, Inc. As part of a broader FHWA study, a panel of approximately 900 Los Angeles residents were subjected to a lengthy interview which explored existing travel behavior and attitudes toward different transit modes and low-capital transportation improvements. The "before" portion of the interview was conducted between March and August, 1975 and the "after" portion was conducted in the Spring of 1977.

2. On-board surveys of bus users were conducted by SCRTD and SMMBL. The date of the SCRTD survey was June 30, 1976, while the SMMBL survey took place on August 12, 1976. (See Appendix A for sample forms.)

3. A license plate-based survey of corridor drivers was conducted by CALTRANS following the close of the Diamond Lane project. The survey produced 2,700 usable responses from carpoolers, single auto drivers, and users of surface streets. The survey explored drivers' attitudes and activities before, during, and after the Diamond Lane project. (See Appendix A for sample forms.)

In addition to these scheduled surveys, a number of additional surveys were undertaken by different parties once the Diamond Lanes became a burning issue in Los Angeles. These surveys included a number of ad hoc newspaper polls, a polling of SCRTD drivers by the SCRTD planning department, and a survey of carpoolers by Commuter Computer.

Media Reports. Radio and television commentary on the Diamond Lane project were monitored, and a clipping file was maintained containing all related articles and editorials appearing in the local and national press.

Additional Monitoring of Public Attitudes and Reactions. In cooperation with the Los Angeles Mayor's office, a central telephone number was established at the start of the project to serve as a lightning rod for public opinion and to provide Los Angeles residents with information on bus schedules, carpooling, alternative routes, and preferential lane use. All calls to this center were monitored during the first month of the project.

On Monday, June 21, a Los Angeles councilman scheduled a public hearing on the Diamond Lane project. The proceedings of this hearing were recorded, and a representative of the evaluation team attended most of those meetings of public agencies when Diamond Lane deliberations were scheduled to take place. Finally, the evaluation team attended the District Court trial and obtained transcripts of relevant testimony and findings.

4.2 IMPLEMENTING THE EVALUATION PLAN

4.2.1 Organizational Responsibilities

Responsibility for developing and implementing the evaluation plan lay with SYSTAN, Inc. Responsibility for collecting the data specified in the evaluation plan, however, was divided among the many local agencies responsible for implementing the project itself. The specific data collection responsibilities of these agencies are summarized below:

CALTRANS Data Collection Responsibilities: Vehicle volume measurements, vehicle occupancy counts, speed runs, time lapse photography and aerial photography on the Santa Monica Freeway and corridor arterials; fuel consumption estimates; air pollution measurements; and developing and mailing license-plate survey.

SCRTD Data Collection Responsibilities: Making "before and after" point checks on existing lines affected by the new service; measuring patronage and reliability on new lines and control routes; conducting on-board surveys; and developing, conducting, and summarizing driver surveys.

SMMBL Data Collection Responsibilities: SMMBL's data collection responsibilities were similar to SCRTD's for its set of affected routes. These included point checks on existing lines before and after start of the project; measurements of patronage and reliability of new lines and control routes; and surveys of passengers on new service.

CHP Data Collection Responsibilities: Collecting freeway accident data; maintaining records of warnings and citations issued for lane violations; and recording deployment levels and problems.

LAPD Data Collection Responsibilities: Collecting accident data on city streets; recording any special surface street enforcement needs created by project implementation.

LADT Data Collection Responsibilities: Making vehicle volume counts and speed runs on surface access streets perpendicular to the corridor; processing accident data collected by LAPD.

Mayor's Office Data Collection Responsibilities: Assisting evaluation contractor in monitoring and collecting phone-in responses to the project.

SYSTAN, Inc. was responsible for assembling the field data collected by the diverse study participants, assessing its validity and applicability, performing the statistical tests and comparisons specified in the evaluation plan, analyzing the results of these comparisons, and preparing the current report. In view of the controversy surrounding the project, the adversary positions assumed by several local agencies, and the publicly expressed concern for statistical verification, it should be emphasized that SYSTAN undertook an independent analysis of all data elements collected by the local participants. Field data were reviewed and summarized independently, even when summaries had been previously prepared by local agencies. Thus, the results and conclusions presented in this document were developed from the ground up, on the basis of raw field observations such as those displayed in Appendix B.

In addition to preparing the evaluation plan and processing and analyzing the data collected in accordance with that plan, SYSTAN monitored the data collection activities, helped to coordinate the efforts of the various Federal, state and local participants, undertook specialized data collection tasks to characterize the local setting, and assisted in the design of survey materials.

4.2.2 Evaluation Schedule

Exhibit 4.3 depicts a schedule of data collection activities, displayed in relation to the life-span of the project. Safety and enforcement data were collected continuously throughout the demonstration, while vehicle flow and transit ridership were measured twice weekly. The original evaluation plan called for the bulk of the remaining data collection activities to be focused in these time periods: (1) the month preceding project implementation, (2) one month following project implementation, and (3) sometime following the opening of Los Angeles schools in September 1977 by which time it was hoped the project would have achieved a steady state. The premature demise of the project occurred before the last scheduled round of data collection could be accomplished.

The data collection schedule shows both the cancelled implementation date of September 29, 1975 and the actual implementation date of March 15, 1976. The previous date is shown because the last-minute decision to postpone project implementation until the 1976 date was made after certain preliminary data collection activities had already been initiated. The FHWA home interview survey was initiated in mid-August, 1975, while SCRTD point checks on existing lines were taken in September, 1975, and a number of CALTRANS speed runs were made prior to the originally scheduled implementation date of June 15, 1975.

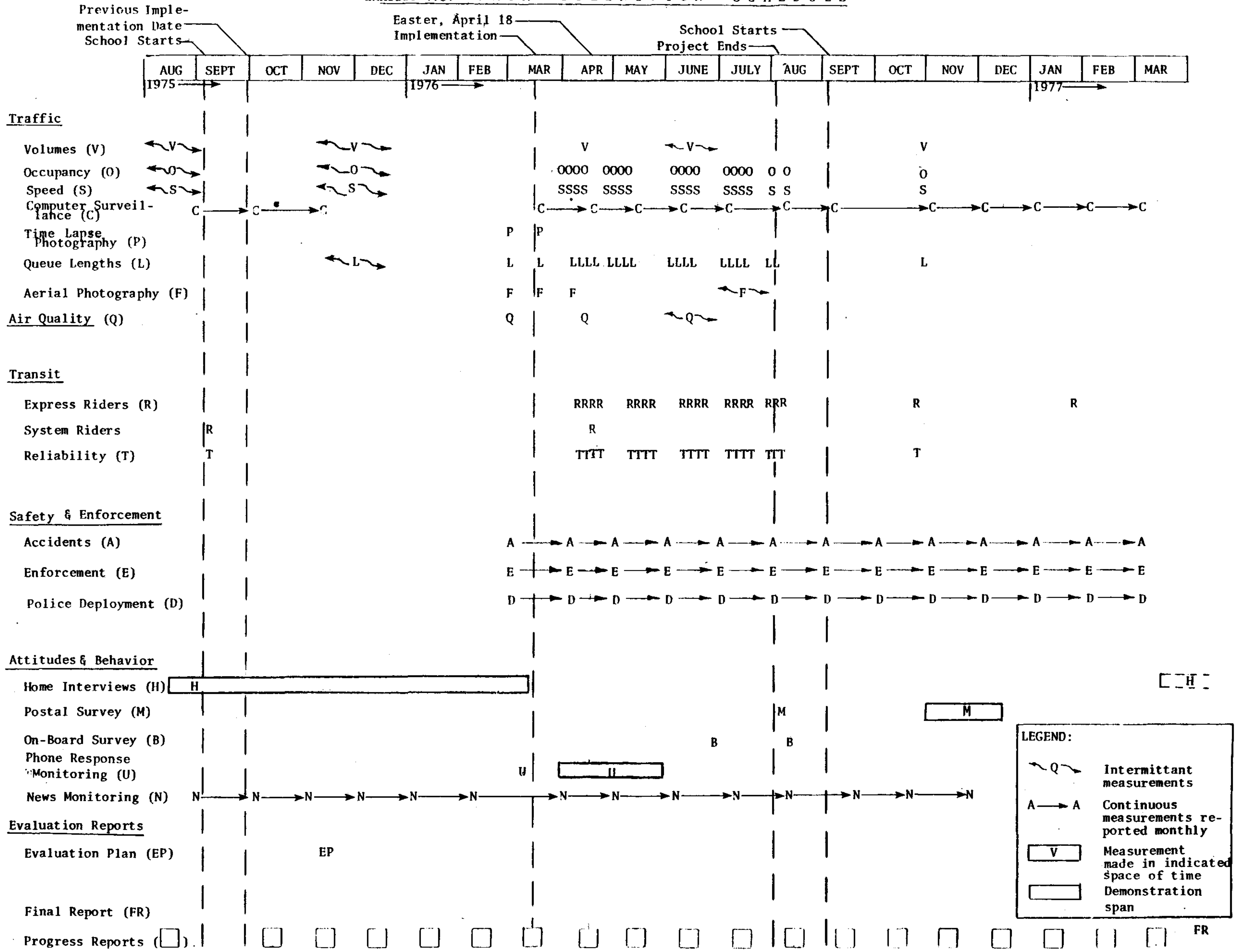
4.2.3 Deviations From the Evaluation Plan

For the most part, preliminary data collection activities and the early evaluation activities prescribed for the first month following the demonstration proceeded in accordance with the evaluation plan.[1] As the controversy surrounding the demonstration increased, and the life of the project itself was threatened, certain changes were imposed upon the evaluation. The most prominent departures from the original plan are noted below:

- As a result of personnel turnovers and manpower shortages, CALTRANS was unable to accomplish certain of the specified pre-project data collection activities. Although most of the required preliminary data were collected, samples of delays on westbound ramps were limited, and eastbound speed runs were not timely enough to reflect the effects of ramp metering. The effects of these data shortages on the evaluation are discussed in detail later in this report.

- In response to the public debate over the project and the interest of the news media, both CALTRANS and SCRTD intensified their data collection activities during the demonstration itself. As a result, far more data on vehicle speeds, volumes and occupancies and express bus ridership was collected than was originally specified in the evaluation plan. This surplus of data improved the statistical reliability of the evaluation findings and contributed significantly to the understanding of events during the hours of Diamond Lane operation.

EXHIBIT 4.3: DATA COLLECTION SCHEDULE



- The adversary position adopted by the LADT made it difficult for the evaluation team to obtain city street volume and speed data in a timely manner. Although these difficulties were resolved just prior to publication of this report, not all surface street data were subjected to the thorough analysis stipulated in the evaluation plan.

- As the data collection and evaluation efforts connected with the Diamond Lane project progressed, certain trends emerged which merited a deeper investigation than originally proposed in the evaluation plan. The most significant of these trends was the disturbingly high accident rate, which far exceeded both pre-project levels and planning expectations. In response to these accident rates, more detailed evaluation procedures were established in the hope of not only documenting the increased rate but also of isolating the reasons for the increase. CALTRANS developed more elaborate classification schemes for recording and classifying accidents, while SYSTAN developed and tested a number of hypotheses concerning the possible reasons for the increased accident levels.

- The continuing threat of a premature project termination generated a number of contingency plans and caused the rescheduling of several evaluation activities originally planned for the latter months of 1976. Survey activities were particularly altered by the threat of shutdown. In response to this threat, bus and auto surveys were hurriedly developed and plans were formulated for the early application of these surveys. The SCRTD onboard survey was executed in mid-June, while the SMMBL survey was administered on August 12, just before the project's official close. CALTRANS photographed the license plates of Diamond Lane users on June 7 to provide a basis for a mail survey. Subsequent photographs of all corridor drivers were made following the project close to provide a broader sample for the mail survey, which was conducted in November 1976 using a sample developed earlier against the possibility of early project termination.

- The concept of the mail survey was considerably broadened in an effort to learn more about driver behavior. Originally conceived as a postcard survey to be administered only to carpoolers, the survey was expanded to a four-page questionnaire and the sample population was broadened to include all corridor drivers. Separate surveys were mailed to carpoolers, other freeway users, and surface street users in the hope of obtaining more precise information regarding the changing patterns of movement before, during, and after the Diamond Lane demonstration, and on the attitudes and motivations behind these changes.

- A round of post-project data collection activities was scheduled to document conditions following project termination. These activities resembled the "before" data collection program, and were accomplished during October and November 1976 (see Exhibit 4.3). The purpose of the post-project evaluation was to document any lasting changes in carpool use and bus ridership, provide a better understanding of the impact of the Diamond Lane itself, and fill a few analytic gaps not anticipated in the original evaluation plan. The results of these post-project analyses are presented in a series of post-scripts added to appropriate chapters of this report.

4.3 COPING WITH THE CUT-OFF

The abrupt termination of the demonstration proved to be somewhat damaging to the evaluation process, but far from fatal. Judge Byrne's decision terminated the project before a steady state had been reached, before the end of summer vacation had returned traffic conditions to a state comparable to that recorded prior to the project, and before adequate data samples had been collected in certain areas, notably the area of air quality. The termination of the project also closed off the evaluator's ability to explore new avenues of investigation suggested by the initial results of the data analysis. Nonetheless, contingency planning made it possible to conduct most of the surveys specified in the evaluation plan, a considerable quantity of data was amassed during the project, and data taken following the project has helped to shed some additional light on the effects of the Diamond Lanes themselves.

With a few exceptions, more than enough data were collected to document exactly what happened during the five months the project was in operation. The chief effect of the abrupt termination of the demonstration, and the hullabaloo surrounding the project, was to cloud the evaluators' ability to interpret the data in terms that are unambiguous and meaningful for other jurisdictions interested in the potential application of preferential lanes. The most serious analytic drawbacks stemming from the project's termination are listed below:

- The Threat of Termination. From the first day of the project, the possibility of termination was openly admitted by project administrators, pondered by planners, prescribed by the press, and pleaded for by the public. It is impossible to assess with any precision the effect that the apparently temporary nature of the project had on carpool build-up and bus ridership. Clearly, the threat of termination must have dissuaded some lone drivers from taking the often significant steps necessary to a form a carpool, but it is impossible to gauge the precise impact of this threat in discouraging carpooling.

- Termination in Transit. The demonstration was terminated at a time when such critical measures as carpool ridership, bus patronage and speeds in the non-preferential lanes were all displaying slight but distinct upward trends. There is no way of knowing how long these trends would have continued to improve project performance before a steady state was reached. In the case of the El Monte busway, ridership continued to grow for three years before reaching a plateau. Similarly, the abrupt termination makes it impossible to know whether the accident rate would have decreased with time, and hence frustrates the analyst's ability to determine the precise extent to which the increased rate might be traced to the newness of the project and the gawking accompanying this newness.

- The Midsummer Misfit. All pre-project data reflect travel conditions during the winter, with full school and employment rosters contributing to the commuting problem. The evaluation plan called for all major measurements to be made under similar conditions, and the final round of data collection activities was originally scheduled for the winter of 1976. The mid-summer termination date means that the last two months of demonstration data were taken under conditions that are not strictly comparable with the pre-project data base. Thus, what appears to be a decline in traffic volumes on surface streets may be a natural consequence of the vacation season, rather than a result of driver decisions to return to the freeway. Similarly; the late-project increase in carpoolers may be family vacationers or groups of beachgoers that would disappear with the winter months. To some extent, these uncertanties can be resolved through the use of surveys and control-route checks. However, the evaluation plan did not anticipate the need to explore these questions, and a good deal of uncertainty surrounds the interpretation of the summer data.

- The Not Quite Ample Sample. In some cases, the abrupt project termination cut off data collection activities before a sufficient quantity of data could be amassed to ensure the desired level of statistical significance. This was particularly true in the case of air quality measurements. Other instances in which the data samples proved to be insufficient are discussed in appropriate analytical sections.

The above considerations should not be interpreted as criticisms of the decision to terminate the project. Considerations concerning the evaluation process will usually be subserviant to considerations concerning the management of the demonstration, which in this case were subserviant to a judicial decision. Given the project's toll in accidents and good will, a number of valid arguments could be--and were--assembled in favor of termination. Valid arguments could also be cited against a decision to terminate the project. The considerations are not cited as arguments against the termination, but rather as a warning to the reader that the sudden closing of the demonstration had an effect on the evaluation which must be recognized in interpreting the analytic findings reported in the following chapters.

REFERENCES, CHAPTERS 2, 3 AND 4

1. SYSTAN, Inc., Evaluation Plan for the Santa Monica Freeway Preferential Lane Project, for the Transportation Systems Center of the Urban Mass Transportation Administration, Contract No. DOT-TSC-1084, November 1975.

2. American Institute of Planners, Southern California Section, "The Santa Monica Freeway's Diamond Lanes: A Policy Background Paper," Los Angeles, California, November 8, 1976. (SYSTAN is indebted to this source for much of the pre-1975 history of preferential lane planning activities in Southern California.)

3. California Department of Transportation, California Highway Patrol, City of Santa Monica, and Southern California Rapid Transit District, Application to the Urban Mass Transportation Administration for a Demonstration Grant for the Santa Monica Freeway Preferential Lane Project, April 1975.

4. Wilbur Smith and Associates, "Downtown Los Angeles Travel Surveys," prepared for the Southern California Rapid Transit District, Los Angeles, California, July 1975.

SECTION 3

FREEWAY AND BUS OPERATIONS

5. TRAFFIC CONDITIONS AND MOTORIST BEHAVIOR

This chapter chronicles the traffic conditions in the Santa Monica Freeway corridor before and during the Diamond Lane project and explores the effect of these conditions on such aspects of motorist behavior as carpool formation, route choice, and trip scheduling. The chapter begins with a summary of the changes in Freeway operation accompanying the Diamond Lane project (Section 5.1). In addition to the reserved lane itself, these changes included significant alterations in the metering rates at Freeway on-ramps, the opening of an additional entrance ramp for buses and carpools in the downtown area, and several adjustments in the vicinity of the interchange between the Harbor and Santa Monica Freeways. In Section 5.2, the effect of these changes on vehicle speeds and travel times is charted by time of day and and by week as the project progressed. Section 5.3 compares entry ramp delays before and after project implementation, while Section 5.4 combines Freeway travel times and ramp delays to provide a record of the overall changes in travel time experienced by Freeway users as a result of the Diamond Lane project. Section 5.5 records vehicle volumes and occupancy rates in the Diamond Lanes, the non-preferential lanes, and the remainder of the corridor, while Section 5.6 charts the build-up of carpool usage from the beginning to the end of the project. Section 5.7 explores the effect of changing Freeway conditions upon Freeway usage, tracing traffic diversion as drivers shifted to carpools, to city streets, to different starting times, and to different routes in adapting to the altered Freeway conditions.

5.1 SUMMARY OF OPERATIONAL CHANGES

In addition to the creation of the Diamond Lanes themselves, the project implementation was accompanied by other changes designed to ease the flow problems created by removing one lane in each direction from general use. These changes included the opening of a new CBD on-ramp for the exclusive use of buses and carpools, significant alterations in the metering rates at Freeway on-ramps, and the erection of barricades to channel flow in the vicinity of the interchange between the Harbor and Santa Monica Freeways. Whereas the coming of the Diamond Lanes and the opening of the exclusive on-ramp were well-publicized in advance of the March 15 implementation date, the accompanying changes in metering rates and barricade placement were not so well publicized. Consequently, these accompanying changes came as a surprise to most motorists when they were introduced, and helped to contribute to the confusion and frustrations of the early weeks of the project. This section summarizes the more important operational changes in Freeway traffic control introduced on the Santa Monica Freeway on March 15, 1976.

5.1.1 Diamond Lanes

The major change in Freeway operation was, of course, the reservation of the lane next to the median for the exclusive use of buses and vehicles carrying three or more persons. The preferential lanes were marked with large painted diamonds and directional signs strategically placed along the Freeway. These Diamond Lanes were created not by adding lanes to the existing travelway, but rather by restricting the use of lanes previously available to all traffic. No barriers separated the reserved lanes from general traffic, so buses and carpools were free to enter or leave the lanes anywhere along the route. Hours of operation were originally 6:00 to 10:00 A.M. and 3:00 to 7:00 P.M. weekdays, in both directions. The morning hours of operation were changed on May 17 to 6:30 to 9:30 A.M.

5.1.2 Flower Street On-Ramp

The northbound Harbor Freeway on-ramp at Flower Street in downtown Los Angeles joins an auxiliary lane leading directly into the Santa Monica Freeway interchange. This ramp had been closed for several years prior to the Diamond Lane project. With the implementation of the Diamond Lanes, this ramp was reopened for the exclusive use of buses and high-occupancy vehicles. The ramp leads directly to the westbound preferential lane of the Santa Monica Freeway, and permitted buses and carpools to gain access to the Diamond Lane without weaving through several lanes of traffic.

5.1.3 Ramp Metering Adjustments

The volume of traffic entering the Freeway via on-ramps is controlled by metering signals to maintain free flow on the Freeway. Preferential access for vehicles with two or more persons is provided at 12 of the 30 metered entry ramps. With the implementation of the Diamond Lane project, metering rates were adjusted to compensate for the increased congestion accompanying the removal of a lane from general use. These adjustments were made over the week preceding the project and completed on opening day. In most cases, they increased the length of time motorists were required to wait in queues on the on-ramps before entering the Freeway. A complete ramp-by-ramp analysis of the entry ramp delays associated with the Diamond Lane project appear in Section 5.3.

5.1.4 Harbor Freeway Interchange Barricade

In an effort to give traffic from the southbound Harbor Freeway a better chance to merge before entering the westbound Santa Monica Freeway, CALTRANS installed a system of wooden barricades that funneled this traffic onto a narrow distributor road. The distributor road eventually merged with the westbound main line at Arlington Avenue, roughly 2-1/2 miles west of the Harbor Freeway interchange.

Exhibit 5.1 shows the location of this barricade, which was in operation for 24 hours every weekday during the first two weeks of the project. In addition to confining traffic from the southbound Harbor Freeway to the narrow connector road, the barricade system also closed the slip-ramp providing motorists already using the westbound Santa Monica Freeway access to the off-ramps at Hoover Street and Vermont Avenue. The earliest exit point possible for these motorists was the Normandie Avenue exit, which could be reached only by crossing the slower-moving, merging traffic on the narrow distributor road. The barricades came as a surprise to motorists and not only generated angry telephone calls but was also responsible for much of the adverse press criticism during the initial weeks of the project.

The barricades were originally installed by CALTRANS because it was felt that "unrestricted flow through the main entry point would have severely congested the main lines through this section, causing increased backup and delay on the connector road and the main line approaching from the east. The congestion would also have made it virtually impossible to clear the Diamond Lane of non-preferential traffic at 3:00 P.M."[2] As it happened, the barricades themselves apparently contributed to congestion and motorist frustration. According to the Los Angeles Times, the result was "a stop-and-go, bumper-to-bumper, fuel-wasting jam that clogs the Harbor clear back to Sunset Boulevard during rush hours...."[3] The exact extent of this jam was never measured precisely, since CALTRANS acted expeditiously to remedy the situation. By March 29, two weeks after project implementation, the controversial barricade had been replaced by a metered signal on the transition roadway between the southbound Harbor Freeway and the Santa Monica Freeway.

5.1.5 Surface Street Changes

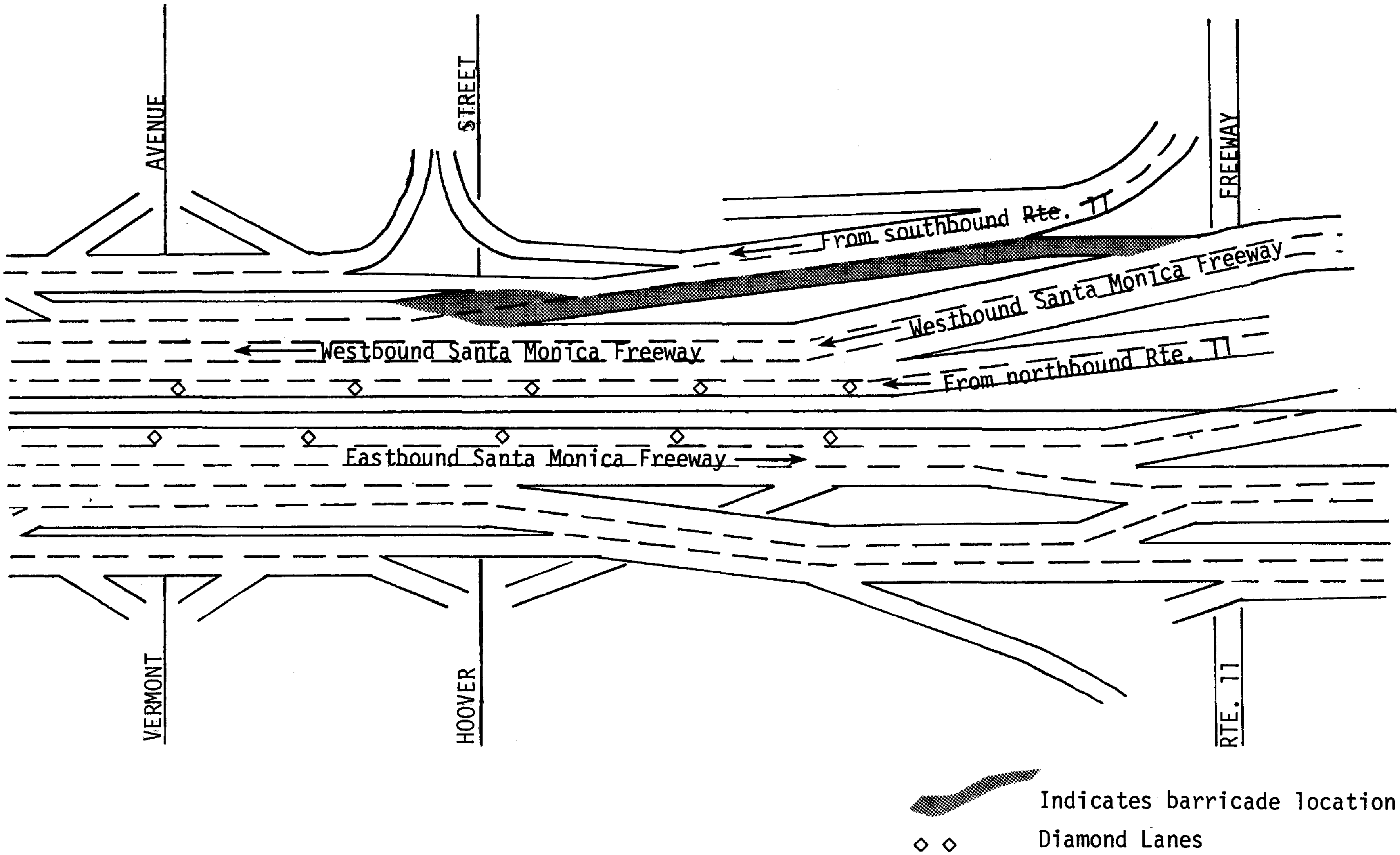
Under the jurisdiction of the Los Angeles City Traffic Department (LADT), several improvements were introduced on surface streets within the corridor to ease the flow of traffic diverted from the Santa Monica Freeway to parallel arterials during the Diamond Lane project. Major signal timing changes were made along the length of Olympic Boulevard within the affected corridor beginning the weeks of April 12 and April 26. In addition, traffic signal coordination was improved on Venice Boulevard between La Cienega and Figueroa and on Washington Boulevard between Fairfax and Figueroa during the weeks beginning April 23, April 30, and May 3, 1976.

In April 1976, peak-hour parking prohibitions were introduced on the eastbound portion of Olympic Boulevard between Century Park West and Sawtelle. At the same time, the westbound portion of the same roadway was restriped to add a fourth lane. Later in the project, in September 1976, peak-hour parking prohibitions were introduced on Washington Boulevard between Union and Victoria, and on Olympic Boulevard from Robertson to the Harbor Freeway.

EXHIBIT 5.1

LOCATION OF HARBOR INTERCHANGE BARRICADE

(Introduced March 15, 1976; Replaced With Meter March 29, 1976)



At several of the freeway on-ramps with preferential bypass lanes to the left of the metered lanes for general traffic, it was originally feared that increasing queue lengths would make it difficult for vehicles to complete left turns into the metered lane, and that this difficulty would increase the congestion experienced on the north-south streets feeding the on-ramp. To minimize this congestion, left-turn restrictions were introduced on several north-south streets with the start of the Diamond Lane project. Vehicles with two or more occupants were exempted from these restrictions, which were in effect at the following on-ramps:

Eastbound Ramps (A.M. Only)	Westbound Ramps (P.M. Only)
Cloverfield	Western
Crenshaw	Vermont
Bundy	Crenshaw

These restrictions, which were the source of some conflict between CALTRANS and the LADT, were unilaterally removed by the LADT on April 8, 1976.

5.2 VEHICLE SPEEDS AND TRAVEL TIMES

The dedication of the Diamond Lanes to the use of buses and high-occupancy vehicles, and the accompanying changes in ramp metering rates and interchange configurations, had a marked impact on vehicle speeds on the Santa Monica Freeway. The speeds of vehicles using the Diamond Lanes were significantly faster and steadier than the speeds of vehicles in the remaining non-preferential lanes. The speeds of vehicles in these remaining lanes were generally lower than those experienced on the Freeway prior to the initiation of the demonstration, and varied significantly from hour to hour and from one Freeway location to another. This subsection examines vehicle speeds and travel times by hour and by week as the project progressed.

5.2.1 Average Non-Preferential Lane Travel Times

Travel times and speeds on the Santa Monica Freeway were measured on a representative sampling of days by two mechanisms.* A number of speed runs were made between Lincoln Boulevard and Grand Avenue

*More details on the data collection mechanisms employed in the project may be found in the Evaluation Plan for the Santa Monica Freeway Preferential Lane Project (Reference 1).

nearly one year prior to project implementation, and again during the early weeks of the Diamond Lane demonstration. These speed runs were supplemented with speed measurements obtained from the computerized sensors spaced along the length of the Freeway. Data recorded from these sensors were used almost exclusively to record speeds and travel times during the later stages of the project. Computer data were also used as a source of the Freeway speeds experienced during the winter of 1975, following the introduction of ramp meters to control traffic on the eastbound Freeway lanes.

Table 5.1 records the average weekly travel times and speeds measured in the non-preferential lanes during the Diamond Lane project. Travel times are recorded in the peak direction of travel over the 12.93-mile length of the project during Diamond Lane operating hours between 6:30 and 9:30 A.M. and between 3:00 and 7:00 P.M.

Prior to the project, a little more than 18 minutes was required to make the westbound trip from Grand Avenue to Lincoln Boulevard during the evening peak. During the early weeks of the Diamond Lane project, this time increased by as much as eight to ten minutes, as the increased accident levels and congestion around the Harbor Freeway interchange slowed traffic considerably. As the project progressed, the accident level declined somewhat (see Chapter 7), meters were installed to control the merging problem at the Harbor interchange, and westbound Freeway speeds improved noticeably. By the last seven weeks of the project, the average travel time in the non-preferential westbound lanes during the peak period had dropped to 19.5 minutes, slightly over one minute longer than the pre-project average.

In the eastbound direction, speed runs made approximately one year prior to project initiation show average travel times of 22.7 minutes between Lincoln Boulevard and Grand Avenue. However, these speed runs were made prior to the activation of ramp meters designed to improve the flow of traffic in the eastbound direction. Following the installation of ramp meters between the San Diego and Harbor Freeways in May 1975, computer records show that the average peak-hour eastbound travel times between Lincoln Boulevard and Grand Avenue had dropped to 15.7 minutes.[1] These travel times rose again to 21.3 minutes during the early weeks of the Diamond Lane demonstration. By the second seven weeks of the project, this time had dropped to 18.8 minutes, but eastbound speeds did not improve further as the project progressed, and the average travel time recorded over the length of the project was 20.2 minutes. Although this represented a slight improvement over the travel times recorded prior to the initiation of ramp metering, it was roughly 4.5 minutes longer than the meter-controlled travel times experienced just before project initiation.

[1]Because the surveillance computer was dismantled for moving shortly after the installation of eastbound ramp meters, a relatively small sample of recorded data is available to support an estimate of pre-Diamond Lane travel times in the eastbound direction. The indicated estimate of 15.7 minutes of total travel time is based on a five-day sample between 6:30 and 9:30 A.M.

TABLE 5.1: AVERAGE FREEWAY TRAVEL TIME AND SPEED IN NON-PREFERENTIAL LANES

Time Period	Lincoln to Grand EB 6:30-9:30 AM		Grand to Lincoln WB 3:00-7:00 PM	
	Time (Min.)	Speed (MPH)	Time (Min.)	Speed (MPH)
Before Diamond Lanes				
February-March '75 (after westbound ramp metering, before eastbound ramp metering)	22.65	36.16	18.35	43.64
October '75 (after eastbound ramp metering between San Diego and Harbor Freeways)	15.69	50.55	18.11	44.86
During Diamond Lanes				
1 (3/15-3/19)	27.69	31.37	26.49	29.85
2 (3/22-3/26)	19.42	41.21	24.85	33.19
3 (3/29 to 4/2)	19.54	41.46	21.80	36.60
4 (4/5 to 4/9)	18.05	43.84	28.74	27.36
5 (4/12 to 4/16)	NA	NA	NA	NA
6 (4/19 to 4/23)	22.42	36.67	25.37	31.59
7 (4/26 to 4/30)	20.61	39.75	24.38	33.26
First Seven Weeks	21.29	39.05	25.27	31.98
8 (5/3 to 5/7)	NA	NA	NA	NA
9 (5/10 to 5/14)	19.45	40.31	20.87	37.84
10 (5/17 to 5/21)	19.70	42.74	22.07	36.47
11 (5/24 to 5/28)	15.64	50.68	19.04	41.59
12 (5/31 to 6/4)	19.50	41.83	20.26	38.72
13 (6/7 to 6/11)	22.26	38.49	21.99	38.38
14 (6/14 to 6/18)	16.33	49.01	20.72	41.96
Second Seven Weeks	18.81	43.84	20.83	39.16
15 (6/21 to 6/25)	18.72	43.02	17.92	44.42
16 (6/28 to 7/2)	19.52	41.97	20.05	39.95
17 (7/5 to 7/9)	22.02	38.10	21.82	39.52
18 (7/12 to 7/16)	20.79	41.28	20.90	39.41
19 (7/19 to 7/23)	20.18	41.36	18.52	43.36
20 (7/26 to 7/30)	23.19	38.59	20.14	40.44
21 (8/2 to 8/6)	18.71	43.34	17.18	46.05
Third Seven Weeks	20.45	41.09	19.50	41.88
Average During	20.18	41.33	21.87	37.67

5.2.2 Average Preferential Lane Travel Times

Freeway sensors located at two different locations in the Diamond Lanes themselves recorded an average Diamond Lane speed of 54.3 miles per hour over the length of the demonstration. These speeds varied only slightly from the initiation of the project to its termination. Speeds dropped slightly as the Diamond Lane drivers proceeded from west to east. The average Diamond Lane speed recorded at La Cienega, midway along the length of the lanes, was 56.2 miles per hour, while the average speed recorded at La Brea Avenue and Crenshaw Boulevard, approximately three miles closer to the Los Angeles CBD, was 53.5 miles per hour.

Speeds in the Diamond Lanes themselves did not vary appreciably by time of day or direction of travel. In general, the lanes were empty enough to provide a clear route of passage to buses and carpools. A limited number of speed runs made in the Diamond Lanes suggested that the length of time required to reach the Lanes for the sample trip between Lincoln Boulevard and Grand Avenue varied somewhat with the direction of travel. Relatively little time was required to reach the Diamond Lanes for the eastbound trip from Lincoln to Grand, with the result that the average time recorded for this trip was 14.7 minutes, representing an average speed of 52.8 miles per hour.[1]

The westbound traveler during the peak hour, however, had to travel through the traffic bottleneck at the interchange of the Santa Monica and Harbor Freeway before reaching the Diamond Lanes. As a consequence, westbound speed runs made during the peak hour in the early weeks of the project show significant delays before the Diamond Lanes are reached. These delays added approximately one minute to the evening trip from Grand Avenue to Lincoln Boulevard via the Diamond Lanes. During the project, the average time required for the evening trip from Grand to Lincoln was 15.6 minutes for carpools and buses. This time, which includes delays encountered gaining access to the lanes, reflects an average speed of 49.4 miles per hour, and represents a savings of 6.3 minutes over non-preferential lane travel and approximately 2-1/2 minutes over pre-Diamond Lane travel.

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[1] Average speeds recorded by sample drivers using the Diamond Lanes are slightly lower than average speeds recorded by in-lane sensors for at least two reasons:

1) The sample drivers traveled at lower speeds while gaining access to the Diamond Lanes; and
2) The sample drivers observed the posted speed limit. There is evidence from observations and from the sensor data to suggest that some Diamond Lane drivers, encouraged by the relative emptiness of the lanes, exceeded the 55 m.p.h. limit.

5.2.3 Surface Street Travel Times

Surface street data were received from two sources: CALTRANS and LADT. Analysis of the data provides a comparison of pre-project and project travel times: increased speeds imply decreased travel times and vice-versa. CALTRANS statistics provide a look at the changes in travel time on east-west surface streets parallel to the Santa Monica Freeway, while data from the LADT permit a study of times on north-south surface streets perpendicular to the Freeway. The parallel streets will be examined first; LADT findings follow.

5.2.8.1 Parallel Surface Streets - Speeds were recorded systematically between Lincoln and Grand on six surface routes parallel to the Santa Monica Freeway: Olympic; Pico; Venice; Washington; a route along Jefferson, Rodeo and Exposition; and a route along Culver, Washington and Adams. These routes are mapped in Exhibit 5.2. On representative days, CALTRANS drivers followed these routes, generally traveling eastbound in the morning and westbound in the evening. They would begin at one end and drive to the other, noting cross streets on a device which recorded speed and time. Then they would return to the origin and make another run. Using several cars, an average of three runs an hour were made. Morning runs were typically made in the inbound (easterly) direction, from 6:00 to 10:00 A.M., while afternoon runs, usually in the outbound (westward) direction, were made from 3:00 to 7:00 P.M. Since the Diamond Lane hours were changed from 6:00 to 10:00 A.M. to 6:30 to 9:30 A.M., speed runs in the 6-6:30 and 9:30-10:00 period were ignored in the analysis to ensure comparable data across all weeks.

In analyzing the speed runs, Western Avenue and La Cienega Boulevard were selected as intermediate points between Grand Avenue and Lincoln Boulevard. Each speed run was coded at three times, between Grand and Western, Grand and La Cienega, and Grand and Lincoln. The distance between these markers, measured for each street and both directions, provided average times and speeds. These speeds and times are listed in Tables 5.2 and 5.3, respectively.

Although the different streets were not sampled with equal frequency before and during the demonstration, all six routes are weighed equally in developing the corridor avenues of Tables 5.2 and 5.3. This corresponds to a statistical experiment in which the CALTRANS driver rolls a die and then makes his speed runs for the day based on the face that turns up. From the observed distribution of the sampling frequency on each street, it is possible to compute the corridor-wide statistics resulting from this evenly-weighted process.

Except for Washington Boulevard, none of the city streets showed statistically significant changes in average speeds over the entire route. Roughly ten speed runs were made on each street in each direction before the Diamond Lane experiment, and 20 runs during the experiment. Thus, small changes in the sample means can be attributed to sampling variability as well as to effects of the Diamond Lane; Washington is the exception. A special analysis for this

EXHIBIT 5.2

PARALLEL SURFACE ROUTES

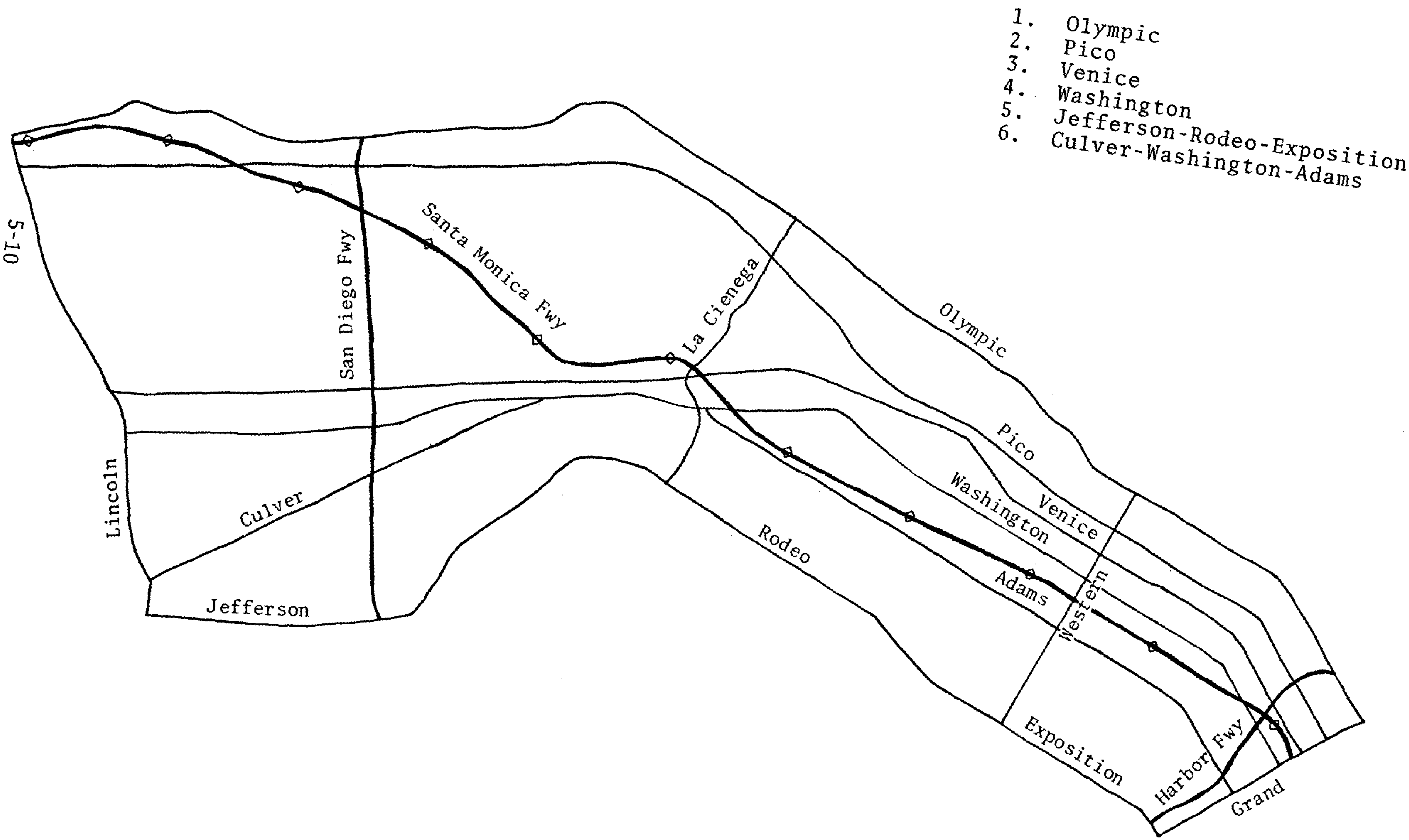


TABLE 5.2: TRAVEL SPEEDS ON CORRIDOR STREETS

	Inbound Morning, 6:30-9:30 A.M. Before 3/15		After 3/15			Outbound Evening, 3:00-7:00 P.M. Before 3/15		After 3/15		
	Mean	Std. Dev.	Mean	Std. Dev.	% Change	Mean	Std. Dev.	Mean	Std. Dev.	% Change
Olympic										
Lincoln - Grand	27.8	2.5	26.3	2.2	- 5	24.6	2.5	23.8	5.1	- 4
La Cienega - Grand	25.6	4.8	26.0	2.5	+ 1	23.9	2.3	22.1	3.3	- 7
Western - Grand	23.7	7.0	25.2	2.4	+ 7	21.5	2.4	20.5	3.9	- 5
Pico										
Lincoln - Grand	26.7	2.1	25.5	2.8	- 4	22.6	1.7	21.4	2.8	- 5
La Cienega - Grand	24.8	4.7	25.6	2.2	+ 3	22.6	2.6	20.8	3.1	- 8*
Western - Grand	22.8	5.1	25.3	3.1	+11	20.6	3.6	20.3	6.2	- 1
Venice										
Lincoln - Grand	26.5	3.2	26.5	2.8	0	24.3	2.3	23.0	3.3	- 6
La Cienega - Grand	28.2	3.0	29.3	3.0	+ 4	26.0	3.0	24.1	4.0	- 7
Western - Grand	24.7	2.8	26.1	3.0	+ 7	22.9	2.6	21.7	-4.5	- 5
Washington										
Lincoln - Grand	27.0	1.2	24.1	2.1	-11*	25.6	2.3	22.6	1.9	-12*
La Cienega - Grand	28.6	1.2	25.7	2.7	-10*	25.1	1.6	23.4	2.5	- 7*
Western - Grand	27.9	1.2	26.7	2.5	- 5	24.6	2.7	25.2	3.7	+ 2
Jefferson/Rodeo/Exposition										
Lincoln - Grand	28.4	2.1	28.7	1.9	+ 1	24.1	2.5	25.1	1.4	+ 4
La Cienega - Grand	28.4	2.2	29.0	2.0	+ 2	23.5	2.2	24.5	2.5	+ 4
Western - Grand	26.4	1.7	26.0	4.5	- 1	18.7	2.7	20.3	1.4	+ 9
Culver/Washington/Adams										
Lincoln - Grand	27.1	3.0	25.3	3.3	- 7	24.1	1.3	23.7	2.6	- 2
La Cienega - Grand	28.4	2.4	25.9	4.0	- 9*	23.4	2.3	24.0	3.5	+ 2
Western - Grand	28.4	3.8	25.7	4.6	-10	24.2	2.9	23.4	4.8	- 3
Corridor Average										
Lincoln - Grand	27.2	2.4	26.0	2.9	- 4*	24.2	2.2	23.1	2.8	- 5*
La Cienega - Grand	27.3	3.5	26.9	3.2	- 2	24.1	2.5	23.2	3.4	- 4*
Western - Grand	25.6	4.5	25.8	3.4	+ 1	22.1	3.4	21.9	4.6	- 1

*Indicates change is statistically significant to the 05% level.

TABLE 5.3: TRAVEL TIMES ON CORRIDOR STREETS

	Inbound Morning, 6:30-9:30 A.M. Before 3/15 Mean	Std. Dev.	After 3/15 Mean	Std. Dev.	% Change	Outbound Evening, 3:00-7:00 P.M. Before 3/15 Mean	Std. Dev.	After 3/15 Mean	Std. Dev.	% Change
Olympic										
Lincoln - Grand	31.3	2.8	33.1	2.7	+ 6	35.4	3.6	37.7	6.9	+ 6
La Cienega - Grand	17.0	3.6	16.3	1.6	- 4	17.7	1.6	19.4	3.3	+10
Western - Grand	8.5	3.6	7.2	0.7	-16	8.5	1.0	9.1	2.1	+ 8
Pico										
Lincoln - Grand	31.5	2.3	33.2	3.6	+ 5	37.3	2.9	39.9	6.0	+ 7
La Cienega - Grand	16.8	3.7	15.8	1.5	- 6	18.0	2.2	19.8	3.5	+10*
Western - Grand	7.8	2.9	6.6	0.8	-15	8.3	1.7	8.9	2.7	+ 7
Venice										
Lincoln - Grand	26.8	3.1	26.8	3.0	0	29.1	2.8	31.2	4.5	+ 7
La Cienega - Grand	14.9	1.6	14.4	1.7	- 4	16.3	2.1	17.8	3.3	+ 9
Western - Grand	6.5	0.8	6.1	0.8	- 7	6.9	0.9	7.5	1.8	+ 9
Washington										
Lincoln - Grand	26.3	1.2	29.6	2.7	+13*	27.9	2.5	31.5	2.7	+13*
La Cienega - Grand	13.3	0.6	15.0	1.7	+12*	15.3	1.0	16.5	2.0	+ 8*
Western - Grand	5.4	0.3	5.7	0.5	+ 5	6.2	0.7	61.0	1.3	- 1
Jefferson/Rodeo/Exposition										
Lincoln - Grand	22.7	1.6	22.5	1.5	- 1	26.9	2.9	25.7	1.5	- 5
La Cienega - Grand	11.5	1.0	11.2	0.8	- 2	13.9	1.4	13.3	1.4	- 4
Western - Grand	4.0	0.2	4.2	1.3	+ 6	5.7	0.9	5.2	0.4	- 9
Culver/Washington/Adams										
Lincoln - Grand	25.2	2.4	27.1	3.6	+ 8	28.1	1.6	28.8	3.3	+ 2
La Cienega - Grand	13.2	1.2	14.7	2.5	+12*	15.4	1.7	15.6	2.4	+ 2
Western - Grand	4.9	0.7	5.6	1.4	+13	5.5	0.7	5.9	1.5	+ 7

*Indicates change is statistically significant to the 05% level.

street separated it into three distinct segments (see Table 5.4). The segments between Lincoln and La Cienega and between La Cienega and Western showed significant decreases in travel speeds. This street is just north of the freeway and passes under it at about La Cienega. The delays could have been caused either by congestion backing up from the freeway or by diverted traffic.

Signal progression changes on Washington failed to reverse the decline in travel speeds recorded with the Diamond Lane project. Signal timing and coordination changes on Olympic and Venice may explain the increase in speeds observed during the morning peak, although these increases were not found to be statistically significant. Over all the corridor streets, there is a slight but definite decrease in traffic speeds. The observed decreases in speeds of about four percent occur between Lincoln and Grand mornings and both Grand to La Cienega and Grand to Lincoln in the afternoon. Due to the larger sample size, a four percent change is statistically significant across the entire corridor, but is well within sampling error for an individual street. The magnitude is small -- a driver taking a half-hour on this part of his trip home would find, if he looked carefully enough, that he was taking an extra 90 seconds to cover the same distance during the Diamond Lane demonstration. Presumably, few drivers would choose to travel the length of the project on surface streets. While statistically significant, then, the observed increase appears to be so small as to have little practical importance. It can be assumed that the observed drops in speeds might have been lower had it not been for the signal timing changes made by the LADT early in the project along Olympic.

5.2.3.2 North-South Surface Streets - Prior to the project, there was concern that vehicles backing up from the freeway on-ramps might impede traffic on north-south surface streets. To examine the validity of this concern, changes in travel speeds were also examined for several of these streets. Table 5.5 displays travel speeds on six north-south surface streets -- Overland, Robertson, La Cienega, Crenshaw, Vermont, and Bundy -- for both northbound and southbound traffic during A.M. and P.M. peak periods. Recorded speeds reflect the average of several speed runs made along routes which crossed the Santa Monica Freeway. An average of 14 runs made in each direction during both morning and evening peak periods permits insight into travel time and speed changes along these streets.

A.M. Peak Periods

Speeds in the northbound direction during the morning peak period decreased slightly (but not significantly*) with initiation of the Diamond Lanes. Decreases averaged less than one-half mile per hour (2-1/4%). On La Cienega, a significant* reduction in

*Measured at the .05 level of significance.

TABLE 5.4

TRAVEL TIMES AND SPEEDS ON WASHINGTON BLVD. IN SECTIONS

	Inbound morning, 6:30-9:30 A.M.					Outbound evening, 3:00-7:00 P.M.				
	Before 3/15		After 3/15			Before 3/15		After 3/15		
	mean	std. dev.	mean	std. dev.	% change	mean	std. dev.	mean	std. dev.	% change
Travel Times										
Lincoln - La Cienega	13.0	0.9	14.3	0.9	+10*	12.6	1.6	15.0	1.2	+19*
La Cienega - Western	7.9	0.6	9.3	1.4	+17*	9.1	0.5	10.3	1.0	+14*
Western - Grand	5.4	0.3	5.7	0.5	+ 5	6.2	0.7	6.1	1.3	- 1
Average Speeds										
Lincoln - La Cienega	25.3	1.7	22.9	1.4	- 9*	26.4	3.5	21.9	1.9	-17*
La Cienega - Western	29.3	2.3	25.3	3.7	-13*	25.5	1.5	22.5	2.2	-12*
Western - Grand	27.9	1.6	26.7	2.5	- 5	24.6	2.7	25.2	3.7	+ 2

*Indicates change is statistically significant to the .05% level.

TABLE 5.5: SPEEDS ON NORTH-SOUTH SURFACE STREETS (MPH)

Surface Streets	Northbound AM		Southbound AM		Northbound PM		Southbound PM	
	Before	During	Before	During	Before	During	Before	During
Overland	22.31	23.21	22.32	24.93	21.13	21.57	23.85	22.76
Robertson	19.07	20.24	15.80	16.77	18.81	18.68	15.00	16.17
La Cienega	20.37	16.05	19.20	19.32	17.17	15.75	17.71	15.59
Crenshaw	24.30	21.93	26.40	25.86	21.71	22.71	19.14	21.45
Vermont	18.3	22.3	24.3	26.5	16.0	21.9	18.7	23.2
Bundy	21.4	24.3	27.8	29.3	21.3	22.2	26.8	24.3
Average	21.27	20.79	21.23	23.35	18.77	20.12	20.44	20.24

speed was experienced (4.32 miles per hour), while on Vermont and Bundy speeds increased significantly (4.0 miles per hour and 2.9 miles per hour, respectively). In the southbound direction, the average speed significantly increased after commencement of the project. Increases averaged 2.12 miles per hour (10%). Only on Crenshaw did the speed decrease during the morning peak period in the southbound direction; this decrease was not significant (.54 miles per hour).

P.M. Peak Period

During the evening peak period, the average speed increased in the northbound direction with the project's start by 1.35 miles per hour (7%), and decreased in the southbound direction by 0.20 miles per hour (1%). Neither of these average changes is statistically significant.* Significant increases in speed did occur on Vermont in both the northbound and southbound directions (5.9 and 4.5 miles per hour, respectively) and on Robertson in the southbound direction (1.17 miles per hour). Significant decreases in speed were measured on Overland (1.09 miles per hour) and on La Cienega (2.12 miles per hour).

5.2.4 Comparison of Average Travel Times by Preferential Lanes, Non-Preferential Lanes, and Surface Streets

5.2.4.1 Travel Speeds - Exhibit 5.3E compares average travel speeds between Lincoln Boulevard and Grand Avenue for traffic on surface streets, in the Diamond Lanes, and in the non-preferential lanes of the Santa Monica Freeway for the morning hours of Diamond Lane operation. Travel speeds in the non-preferential lanes are shown before the installation of ramp meters in May 1975, after the installation of these ramp meters, and before the Diamond Lane demonstration. Comparison of these speeds shows that the installation of ramp meters significantly improved general freeway speeds, which then deteriorated with the introduction of the Diamond Lanes. Even with the deterioration, however, speeds during Diamond Lane operation were higher than those experienced prior to the installation of ramp meters.

Exhibit 5.3W provides a similar comparison for westbound traffic during the evening rush hour. Again, the deterioration of speeds with the introduction of the Diamond Lanes is clearly shown. The average speeds of Exhibits 5.3E and 5.3W are drawn from samples taken over the three morning operating hours and the four evening operating hours. Consequently, the standard deviations bracketing these averages reflect hour-to-hour speed differences, as well as the predictability of travel speeds over a particular route. Subsequent subsections of this report discuss hourly variations in travel time (see, for example, Section 5.2.5). In general, the standard deviations of samples taken

*Measured at the .05 level of significance.

EXHIBIT 5.3E

A.M. EASTBOUND TRAVEL SPEEDS

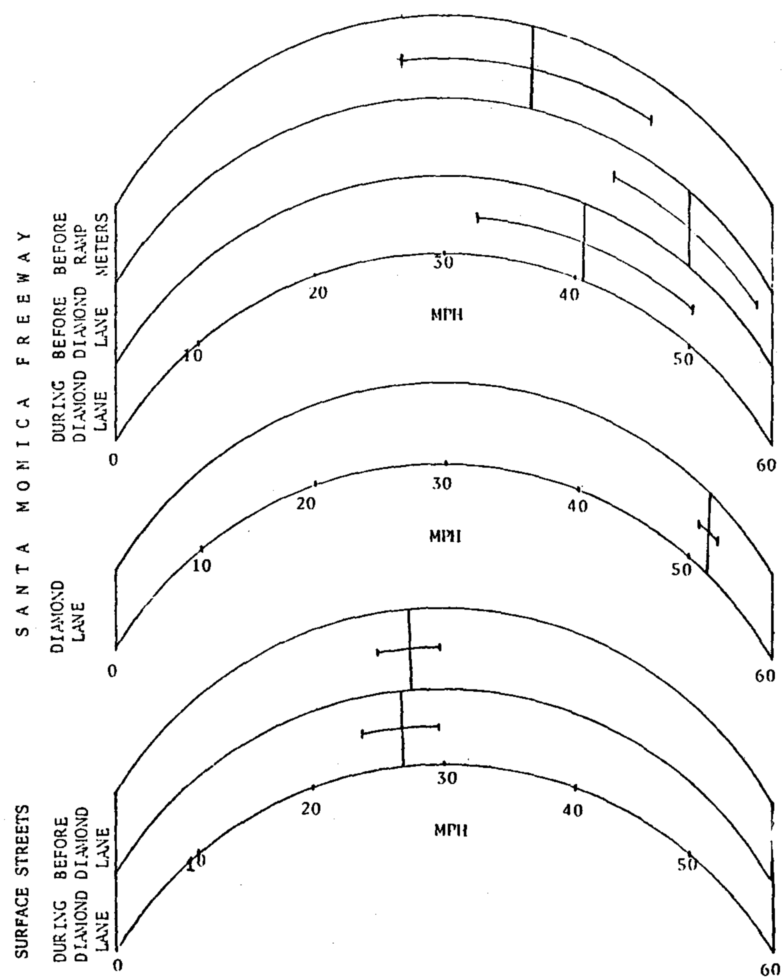
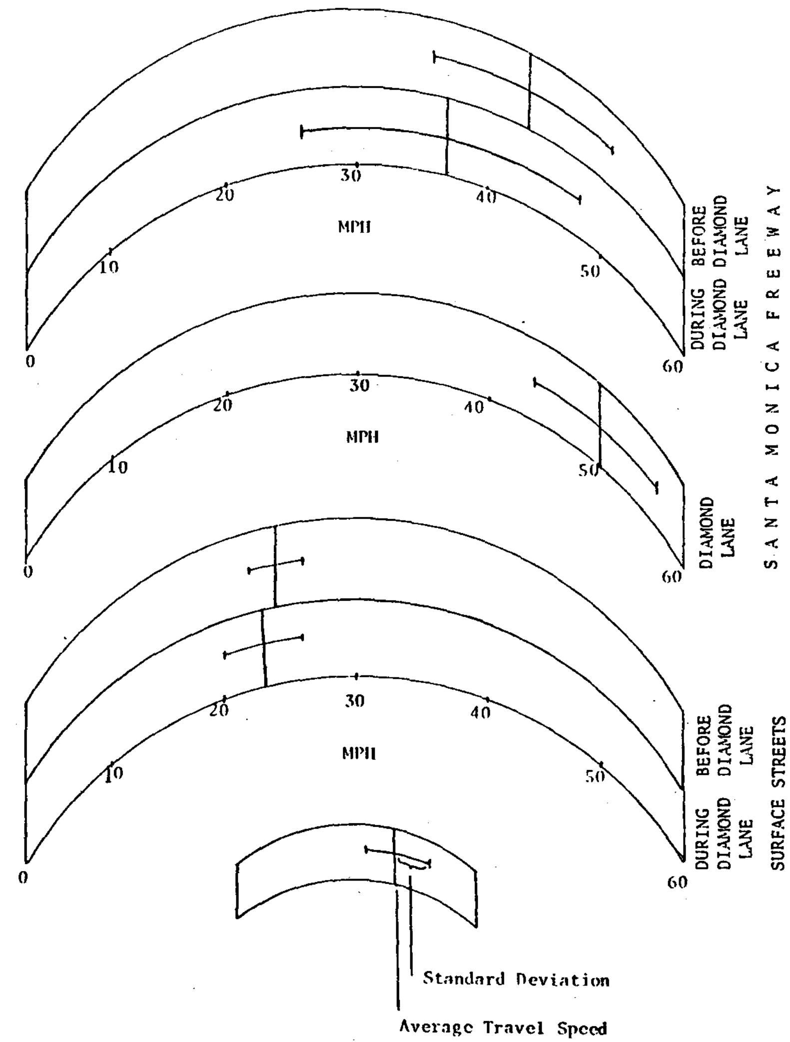


EXHIBIT 5.3W

P.M. WESTBOUND TRAVEL SPEEDS



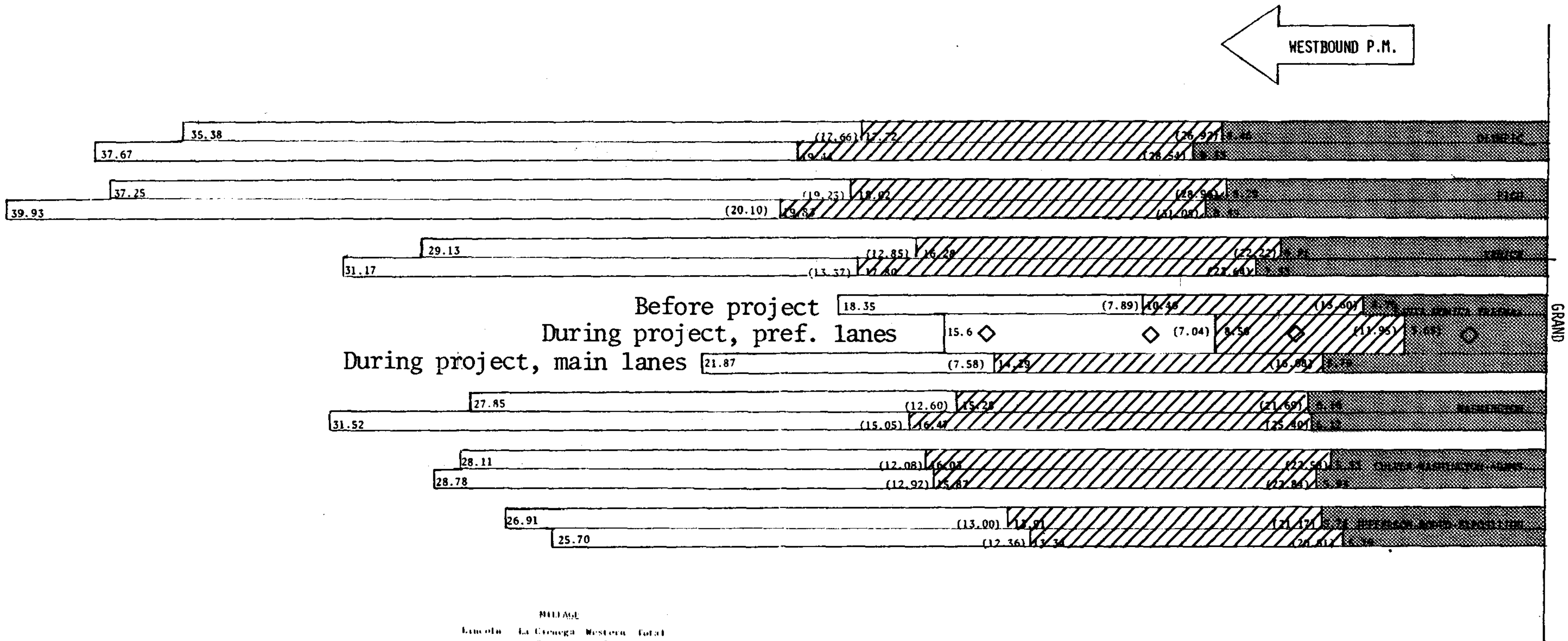
during Diamond Lane operation tended to be slightly larger than samples taken prior to the demonstration, suggesting that speeds were not only slower, but also less predictable during hours of Diamond Lane operation.

5.2.4.2 Travel Times - Exhibit 5.4E charts the average eastbound travel times between Lincoln Boulevard and Grand Avenue for traffic in the preferential lane, in the non-preferential lane, and along selected surface streets for the morning hours of Diamond Lane operation. Travel times on the Santa Monica Freeway are shown before the installation of eastbound ramp meters in May 1975, after the installation of these ramp meters in 1975, and during the Diamond Lane demonstration. Intermediate travel times between La Cienega Boulevard and Grand Avenue and between Western and Grand Avenues are also shown in this exhibit. Because of the different distances between Lincoln and Grand along the various routes depicted in Exhibit 5.4E, travel times are not directly comparable between routes. To provide a common basis for comparison, sample trip distances and speeds are also listed in the exhibit. Exhibit 5.4E shows that the preferential lane of the Santa Monica Freeway offered significant savings to motorists making the trip between Lincoln and Grand during the peak morning hours. The remaining Freeway lanes also offered faster travel over the entire route than any of the alternative surface streets. These travel times do not reflect the time spent driving to and from the Freeway or the delays encountered at the Freeway ramp meters. These delays will be catalogued in later sections of this chapter (Sections 5.3 and 5.4).

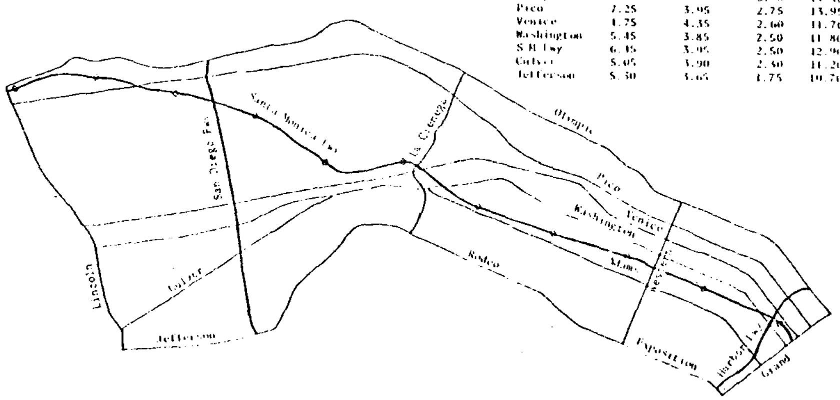
Exhibit 5.4W charts the average westbound travel times between Grand Avenue and Lincoln Boulevard for traffic in the preferential lanes, in the non-preferential lanes, and along selected surface streets for the evening hours of Diamond Lane operation. Travel times are shown before and during the installation of the Diamond Lane project. As in Exhibit 5.4E, no allowance is made for delays on on-ramps. The exhibit shows that the introduction of the Diamond Lanes significantly increased the evening travel times of non-carpool vehicles. The increases are particularly marked in the early stages of the westbound trip from the CBD, where congestion around the Harbor Freeway interchange and over the first half of the trip showed the travel time between Grand and Western and between Western and La Cienega to such an extent that motorists could make comparable time between these points on nearly half of the surface routes monitored. Between Grand and Western, for example, the average travel time recorded in the non-preferential freeway lanes during the demonstration was 5.8 minutes. Along Exposition/Rodeo, Adams, and Washington, the sample surface routes south of the freeway, comparable travel times were 5.2 minutes, 5.9 minutes, and 6.1 minutes, respectively. Distances between Grand and Western over these surface routes south of the Freeway are less than the Freeway distance. Nonetheless, before the introduction of the Diamond Lanes, the Freeway offered faster travel from Grand

EXHIBIT 5.4W

AVERAGE WESTBOUND TRAVEL TIMES
GRAND AVE. TO LINCOLN BLVD.
3:00 P.M. to 7:00 P.M.



	MILEAGE			
	Lincoln – La Cienega	La Cienega – Western	Western – Grand	Total
Olympic	7.40	4.00	3.00	14.40
Pico	7.25	3.95	2.75	13.95
Venice	4.75	4.35	2.60	11.70
Washington	5.45	3.85	2.50	11.80
S.M. Fwy	6.45	3.95	2.50	12.90
Culver	5.05	3.90	2.30	11.20
Jefferson	5.30	3.65	1.75	10.70



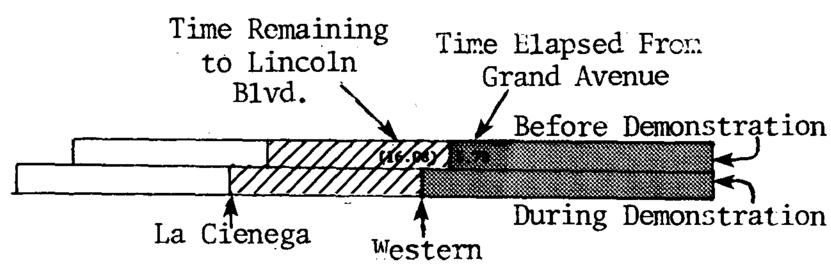
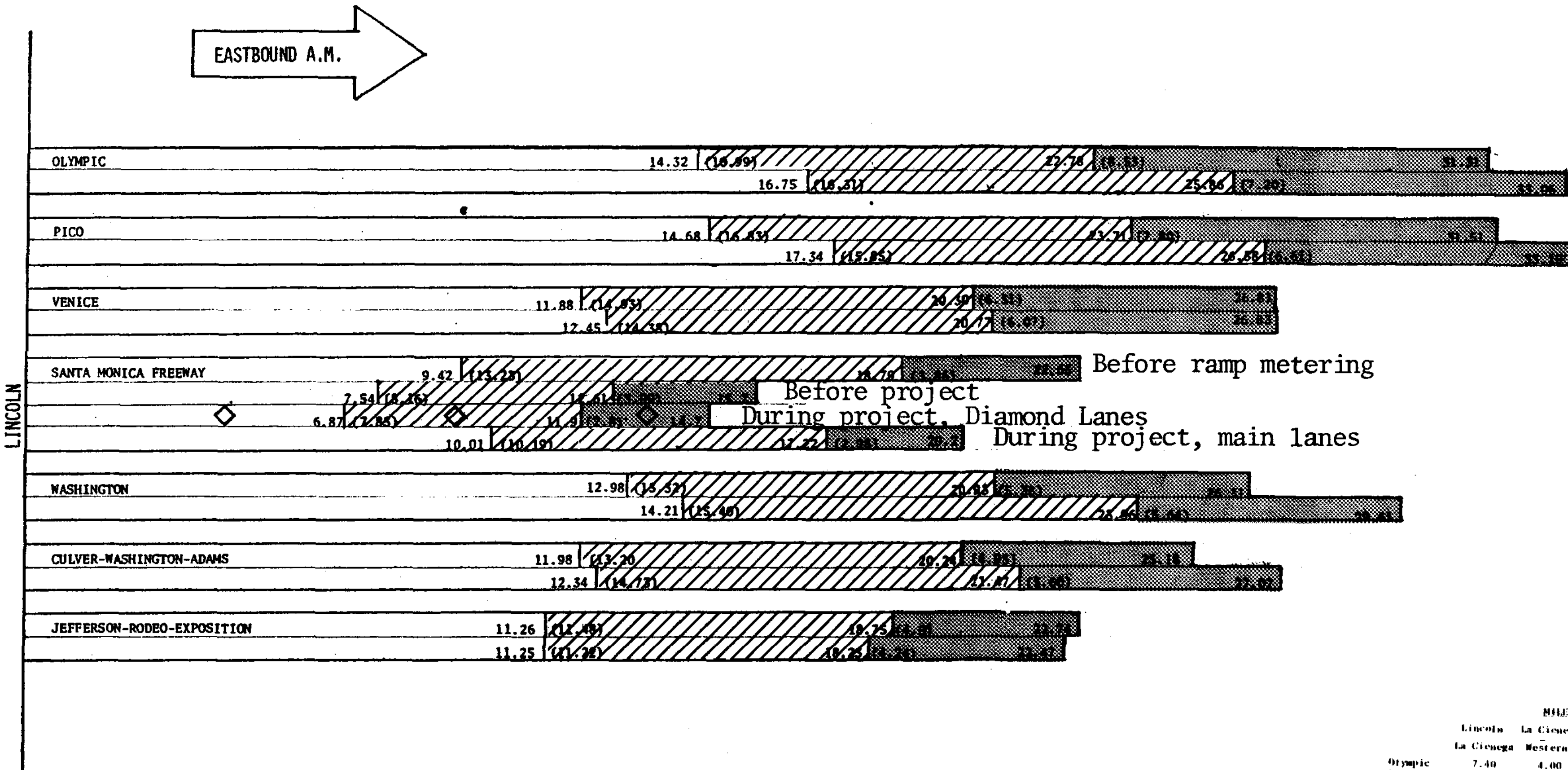
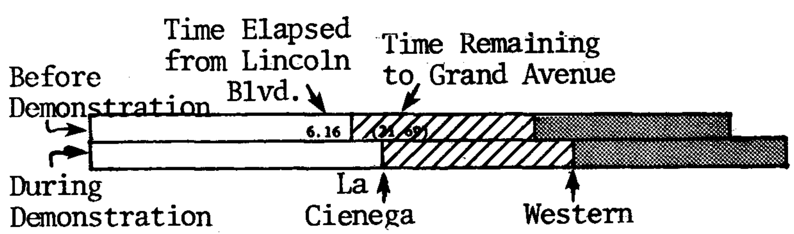


EXHIBIT 5.4E

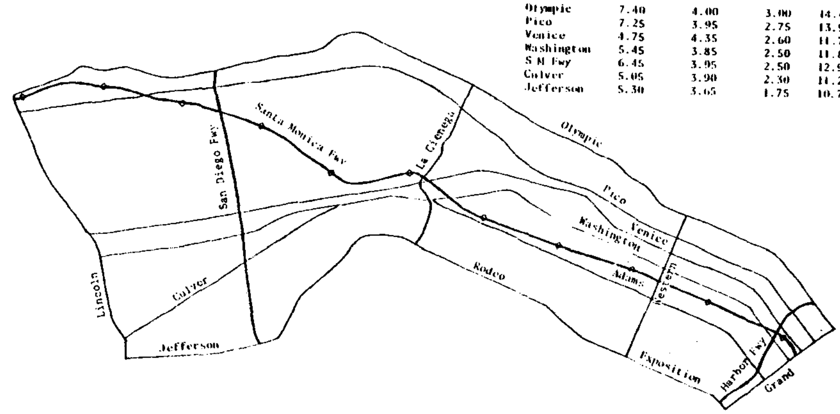
AVERAGE EASTBOUND TRAVEL TIMES
LINCOLN BLVD. TO GRAND AVE.
6:30 A.M. to 9:30 A.M.





MILEAGE

	Lincoln – La Cienega	La Cienega – Western	Western – Grand	Total
Olympic	7.40	4.00	3.00	14.40
Pico	7.25	3.95	2.75	13.95
Venice	4.75	4.35	2.60	11.70
Washington	5.45	3.85	2.50	11.80
S M Fwy	6.45	3.95	2.50	12.90
Culver	5.05	3.90	2.30	11.20
Jefferson	5.30	3.65	1.75	10.70



Avenue to both Western Avenue and La Cienega Boulevard than any of the alternative surface streets, regardless of the distance traveled.

5.2.5 Hourly Travel Time Variations

The travel times charted in Exhibits 5.3 and 5.4 represent an average of measurements made over the duration of the morning and evening Diamond Lane operating hours. Since speeds and travel times varied considerably throughout the morning and evening peak, the speed of the individual motorist was heavily dependent on the hour at which he chose to travel. Table 5.6 breaks down the average travel time measurements in half-hour intervals during the morning and evening peaks for four separate time periods:

Period 1: Before Diamond Lanes and Eastbound Ramp Metering (speed runs made in February and March 1975);

Period 2: Before Diamond Lanes, After Eastbound Ramp Metering (computer measurements from October 1975)

Period 3: During Diamond Lanes (speed runs made between March 15 and July 21, 1976); and

Period 4: During Diamond Lanes -- The Last Seven Weeks (computer measurements between June 21 and August 6, 1976).

Exhibit 5.5 presents graphs of these measurements, showing both the average travel time and the variation about the average by half-hour intervals. As indicated in this exhibit, the introduction of metered control on the eastbound ramps greatly improved travel times between Lincoln and Grand throughout the morning peak. The greatest time savings occurred between 7:30 and 8:30 A.M., when more than eight minutes were cut from the eastbound trip. The introduction of ramp metering not only decreased travel times, but also significantly reduced the variability of those travel times, as measured by the standard deviation about the mean. Thus, that portion of the morning work trip spent on the Santa Monica Freeway became both shorter and more predictable with the introduction of eastbound ramp meters in May 1975.

The subsequent introduction of the Diamond Lanes in early 1976 had the opposite effect. Travel times became longer and less predictable, although the average times remained less than those experienced prior to ramp metering. As the project progressed, the average travel times decreased and the variability lessened, but even during the last seven weeks of the project, both the average times and the standard deviations about these averages remained higher than those experienced in October 1975.

TABLE 5.6: AVERAGE TRAVEL TIME BY TIME OF DAY BETWEEN LINCOLN AND GRAND

Time of Day	BEFORE ◆ LANES				DURING ◆ LANES		LAST 7 WEEKS	
	Feb.-March '75 (Before EB Ramp Metering)		October '75 (After EB Ramp Metering)		Mar.15,'76 - Aug.7,'76			
	Mean (Min.)*	Std. Dev. (Min.)*	Mean (Min.)*	Std. Dev. (Min.)*	Mean (Min.)*	Std. Dev. (Min.)*	Mean (Min.)*	Std.Dev. (Min.)*
EASTBOUND AM								
0630-0900	15.29	0.70	12.76	0.18	17.03	8.00	13.82	0.24
0700-0730	23.37	4.27	15.66	1.41	18.72	7.20	16.04	1.83
0730-0800	26.20	2.25	18.07	1.78	21.08	3.95	21.69	4.96
0800-0830	26.59	3.46	18.01	2.68	21.98	4.30	26.60	6.86
0830-0900	22.95	2.40	15.86	1.25	22.95	7.31	24.97	7.01
0900-0930	17.91	3.90	13.83	.95	18.49	4.57	21.17	4.89
WESTBOUND PM								
1500-1530	15.13	.71			16.00	1.25	15.61	1.87
1530-1600	15.63	.92			19.84	3.66	16.95	2.72
1600-1630	17.21	2.39			21.73	4.67	17.49	3.45
1630-1700	18.54	1.69			23.56	4.77	19.55	4.68
1700-1730	21.35	2.20			25.64	4.79	23.43	6.23
1730-1800	22.96	3.85			28.30	5.79	24.73	5.64
1800-1830	17.25	4.55			24.80	5.79	20.87	4.97
1830-1900	18.01	3.78			22.78	3.94	16.73	3.91

*Indicates Speed Run Measurements
+Indicates Computer-sensed Movement

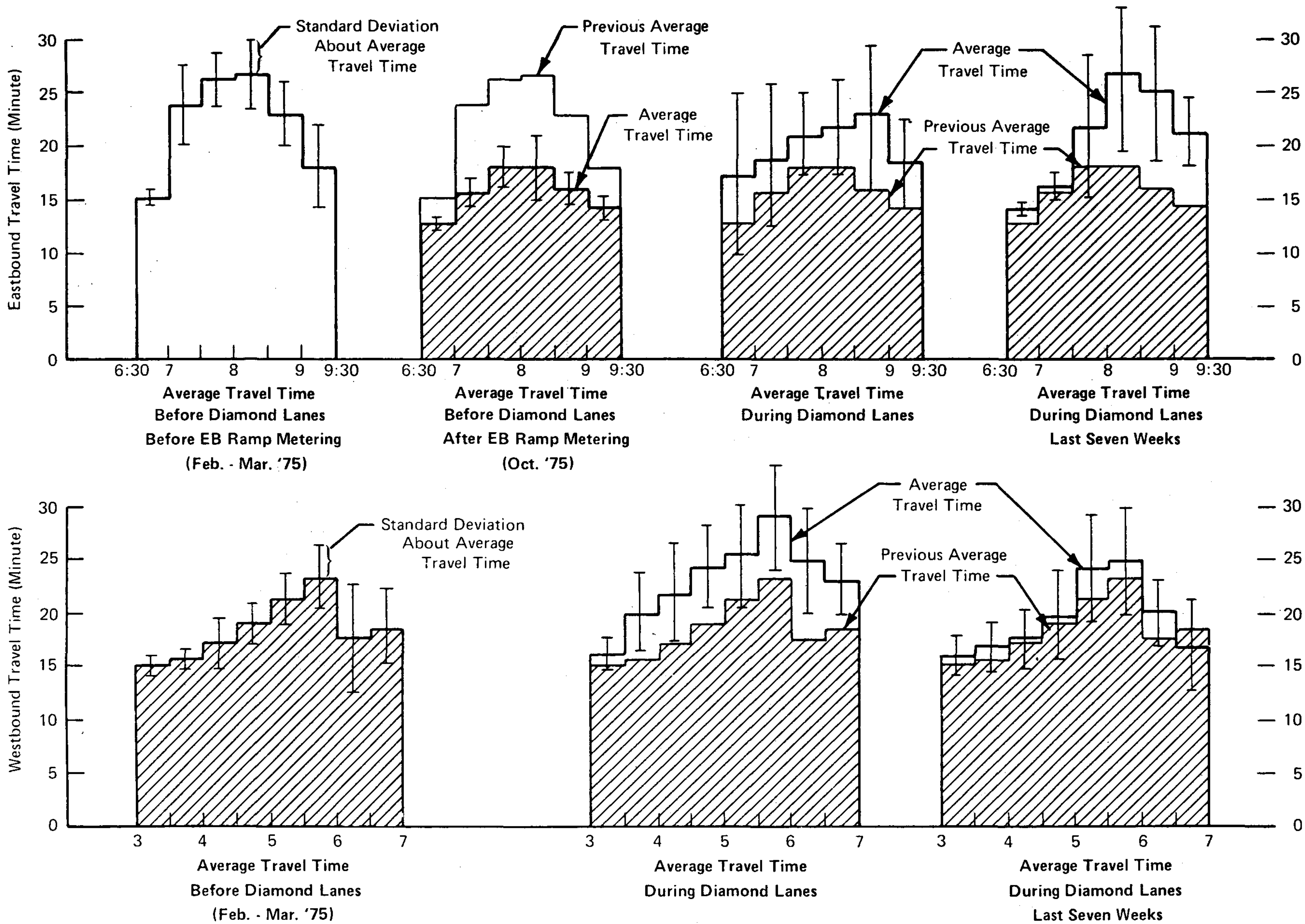


EXHIBIT 5.5

SANTA MONICA FREEWAY TRAVEL TIMES IN NON-PREFERENTIAL LANES

(Lincoln to Grand; 12.93 Miles)

Measurements made in the westbound direction reflect a similar pattern. In this case, the sample speed runs made in February and March of 1975 were made after the introduction of meters on the westbound ramps, so that the travel times during this period reflect the effects of metered control. With the introduction of the Diamond Lanes, travel times increased during each half-hour interval, and the variability of these times increased as well. As Exhibit 5.5 shows, a comparison of the range of travel times experienced during the project with the average travel times experienced prior to the project shows that motorists occasionally experienced pre-project travel times following the introduction of the Diamond Lanes. However, the driver could not count on faster travel times on any given day. As the project progressed, travel times improved and grew more predictable, although neither the consistency nor the low average speeds experienced prior to the project had been attained by the project's termination.

Exhibit 5.5 also highlights the difference between the average travel time over the entire three-hour morning peak and the average travel time actually experienced by motorists during any portion of that three-hour period. Whereas the average peak period travel time during Diamond Lane operation was 20.2 minutes, the average time experienced by motorists traveling during the peak hour between 7:30 and 8:30 A.M. was approximately 22 minutes. Similarly, the average travel time experienced by non-carpooling westbound motorists during the four-hour evening peak was 21.5 minutes. However, motorists traveling between 5:30 and 6:00 P.M. experienced an average travel time of 28.3 minutes between Lincoln Boulevard and Grand Avenue.

5.3 ENTRY RAMP CONDITIONS

Traffic signals installed on the Santa Monica Freeway on-ramps are used to control the number and spacing of cars entering the Freeways during the peak morning and evening hours. These signals limit traffic entering the Freeway from surface streets to a fixed rate of flow designed to allow the Freeway to carry a maximum number of vehicles at speeds between 35 to 50 miles per hour. Vehicles in excess of this number are encouraged to avoid the wait at the ramp by using surface streets for their trip. Typically, this control strategy limits the number of short trips made on the Freeway by presenting drivers making trips with enough of a wait at the ramp so that their total trip time is shortened by using surface streets.

At the start of the Diamond Lane project, the signals controlling traffic at the 30 entry ramps serving the Santa Monica Freeway within the project limits were all activated by fixed-time control devices. These control devices used standard seven-day clocks and were capable of introducing a limited number of pre-selected metering rates during any 15-minute interval. The meters serving the westbound lanes of the Santa Monica Freeway had been in operation since July 1974. Meters serving the eastbound lanes were installed at two different times. Metered on-ramps between the San Diego and Harbor Freeways were introduced in May 1975, while three of the four eastbound ramps west of the San Diego Freeway were not metered until mid-November 1975, and the meter at Cloverfield Boulevard was not made operational until the start of the Diamond Lane demonstration. Thus, all but one of the ramp meters had been in operation at least four months prior to the initiation of the Diamond Lane project. At 12 of the 30 metered entry ramps, preferential access lanes were provided so that buses and vehicles with two or more occupants could bypass the meter system.* These bypass lanes were also in operation prior to the initiation of the Diamond Lane project. Preferential bypass ramps serving the eastbound lanes were installed at the same time as the meter system, while those bypass ramps serving the westbound lanes were opened a few months after the installation of westbound ramp meters in July 1974.

Metering rates on most Freeway access ramps were adjusted during the week preceding the opening of the Diamond Lanes. These adjustments were designed to alleviate the Freeway congestion caused by the proposed Lane restrictions and, in most cases, increased the length of time motorists were required to wait in queues before entering the Freeway. The strategy for adjusting ramp metering rates was formulated after extensive analysis of computerized traffic simulation models developed by Professor Adolph May and the research staff of the Institute of Traffic and Transportation Engineering at the University of California, Berkeley. These models produced theoretically optimum metering plans for both flow directions, and were subsequently adapted by CALTRANS engineers to reflect such practical considerations as ramp storage capacity and existing metering rates.

In some instances, the metering rates governing motorist entry to the Freeway at the start of the Diamond Lane project represented severe departures from pre-project conditions. As the project continued, rates were adjusted in response to actual

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*At the Cloverfield, Bundy, Manning, Venice, Crenshaw, Western, and Vermont on-ramps to the eastbound Freeway and at the Hoover, Vermont, Western, Crenshaw and Fairfax on-ramps to the westbound Freeway, there were special "carpool only" lanes for buses and cars with two or more occupants.

traffic conditions. The slight adjustments to metering rates made during the project were generally attempts to fine-tune the system, and did not match the sweeping changes made before opening day in either the magnitude of the adjustments or the number of ramps affected. In late May, the fixed-time meters at the eastbound Manning and Overland ramps were replaced with traffic-responsive signals whose timing was self-adjusted in response to the flow rates sensed by the vehicle detectors on the Freeway itself. Under the heavy traffic conditions prevalent during most of the Diamond Lane operating hours, these traffic-responsive meters were set to operate in the fixed-time mode. During the off-peak hours and those early and late portions of the peak period when traffic was relatively light, however, the traffic-responsive meters significantly reduced ramp delays.

5.3.1 Eastbound Ramps

Exhibit 5.6 shows the queue lengths, metering rates, and average delays experienced during the peak hour between 7:00 and 8:00 A.M. on the eastbound ramps of the Santa Monica Freeway before and during Diamond Lane operation. Waiting times were computed by observing the length of the ramp queue once each minute for the duration of the peak period, averaging the data over five-minute intervals, and multiplying the average queue length by the metered time required for the passage of a single automobile during that five-minute interval. The single-auto passage time, displayed as the metering rate in Exhibit 5.6, represents the duration of each red-and-green signal cycle. The ramp lengths indicated in the exhibit reflect the estimated storage capacity before a lane of traffic overflows on city streets. Subsequent subsections discuss in more detail the waiting times, meter rates, and queue lengths displayed in Exhibit 5.6.

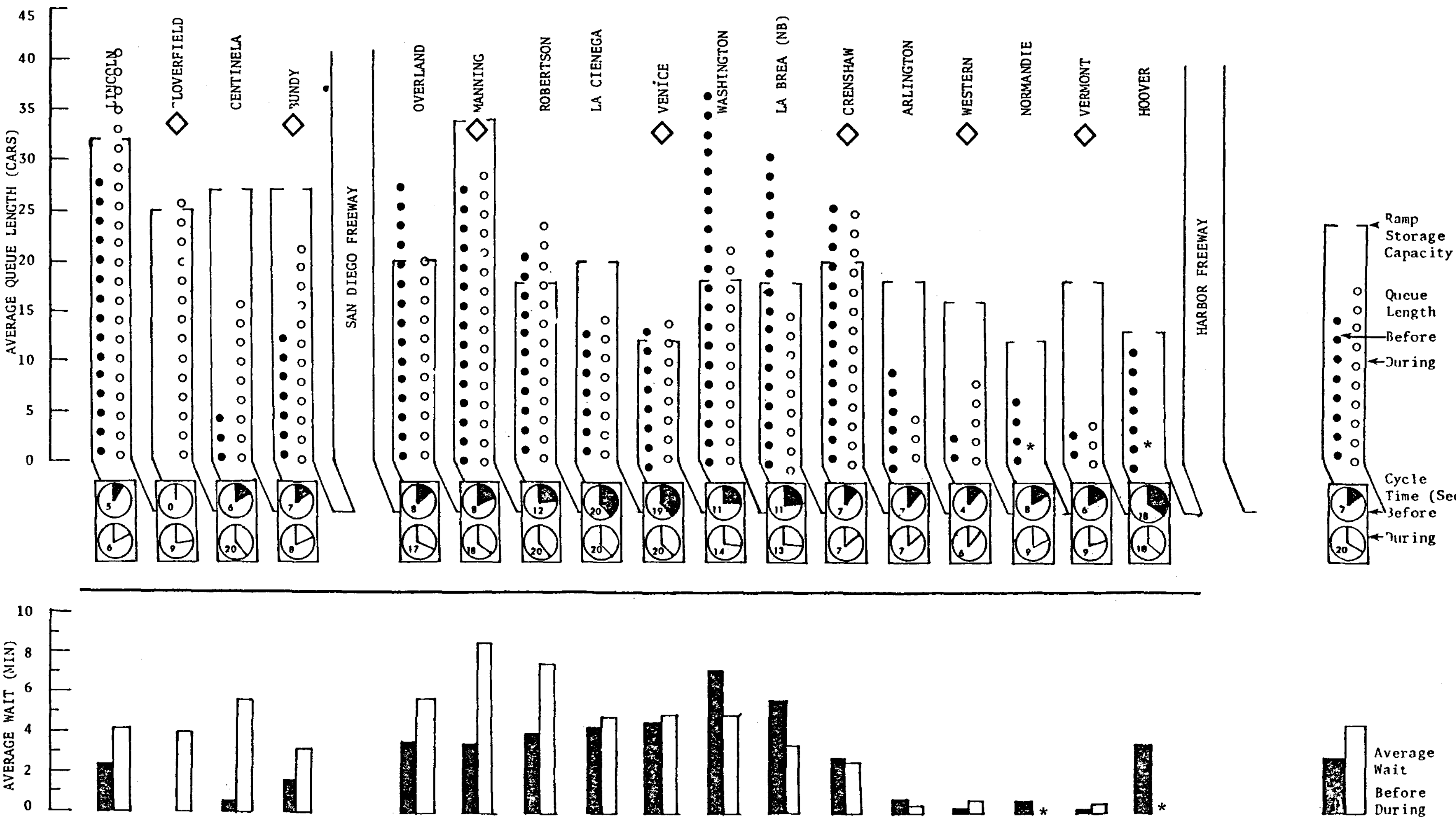
5.3.1.1 Waiting Times - Table 5.7 lists the average waiting times encountered at the eastbound Santa Monica Freeway ramps before and during the Diamond Lane project. Waiting times are given for both the peak period between 6:00 and 10:00 A.M. and for the single peak hour of that period between 7:00 and 8:00 A.M. The maximum waiting time recorded during any five-minute observation period is also listed in the table.

Waiting times were recorded at 14 of the 18 eastbound on-ramps before and during the Diamond Lane project. Table 5.7 shows that statistically significant* increases in peak period waiting times were observed at 8 of these 14 ramps in response to the metering

*Measured at the .05 level of significance.

EXHIBIT 5.6: PEAK-HOUR QUEUE LENGTHS EASTBOUND

(7:00 A.M. TO 8:00 A.M.)



* No data available

TABLE 5.7: EASTBOUND RAMP WAITING TIME STATISTICS (IN MINUTES)

Eastbound Ramp	Peak Period (6-10 AM)				Peak Hour (7-8 AM)				Maximum** Observed Wait	
	MEAN		DIFFERENCE		MEAN		DIFFERENCE			
	Before	During	Increase (Decrease)	% Change	Before	During	Increase (Decrease)	% Change	Before	During
* Lincoln	1.92	2.83[+]	+0.91	47.39	2.31	4.14	+1.83	79.22	5.67	15.63
◇L Cloverfield	0.00[+]	3.03	+2.02•	00	0.00[+]	3.89	+3.89	00	0.00[+]	12.30
Centinela	0.30	3.44	+3.14	1046.67	0.47	5.42	+4.95	1053.19	2.20	9.00
◇L Bundy	1.05	2.06	+1.01	96.19	1.54	3.04	+1.50	97.40	2.57	6.00
* Overland	3.29	3.98	+0.69	20.97	3.55	5.59	+2.04	57.46	8.75	14.00
◇R Manning	2.38	5.40	+3.02	126.89	3.44	8.70	+5.26	152.91	8.13	16.20
Robertson	3.35	4.49	+1.14	34.03	4.05	7.78	+3.73	92.10	7.00	12.33
* La Cienega	2.79	1.61	(-1.18)	42.29	4.27	5.00	(-1.11)	26.00	14.00	5.67
◇L Venice	2.68	2.76	+0.08	2.99	4.40	4.81	+0.41	9.32	10.00	7.00
* Washington	5.36	2.67	(-2.69)	50.19	7.07	4.76	(-2.31)	32.67	19.50	7.70
* La Brea Northbound	3.44	1.65	(-1.79)	52.03	5.72	3.51	(-2.21)	38.64	11.70	7.00
◇L Crenshaw	2.04	1.70	(-0.34)	16.67	2.98	2.81	(-0.17)	5.70	6.00	4.43
* Arlington	0.70	0.37	(-0.33)	47.14	0.99	0.57	(-0.42)	42.42	3.84	1.75
◇R Western	0.26	0.84	+0.58	223.08	0.32	0.90	+0.58	181.25	2.00	2.93
Normandie	0.56	NA	NA	NA	0.90	NA	NA	NA	3.00	NA
Vermont	0.14	0.89	+0.75	535.71	0.27	0.66	+0.39	144.44	1.10	6.67
◇R Hoover	2.17	NA	NA	NA	3.27	NA	NA	NA	9.33	NA

*Two-lane metering.
◇L or R: Left or right preferential bypass lane

**NOTE: Because far more observations were made during the project than before the project, strict comparisons of maximum observed waits "before" and "during" cannot be made. The greater number of observations made during the project ensures that there is a greater probability that a higher maximum will be recorded during the project.

[+]NOTE: Ramp meters at Cloverfield were not turned on until the beginning of the project; thus no waits were recorded before the project's start.

changes and traffic shifts accompanying the project. At four ramps--Washington, La Brea northbound, Crenshaw, and Arlington--statistically significant* decreases in waiting times were observed. Upon commencement of the Diamond Lane project, changes in metering rates at these ramps were either small or non-existent. Because of the increased travel time on the freeway, some users of these easterly ramps probably began to travel on adjacent surface streets, thereby lowering ramp volumes, queue lengths, and waiting times. Relatively light sampling rates at the Venice ramp resulted in tests which showed no significant* changes in the delays.

The largest peak-hour increases in ramp delays were observed at Centinela (a 5.0 minute increase, 1053% over pre-project delays), Manning (a 5.2 minute increase, 152% over pre-project delays), Cloverfield (a 3.9-minute increase, where no delay had previously existed), and Robertson (a 3.7-minute increase, 92% over pre-project delays). These ramps also showed large increases in waiting time over the entire four-hour morning peak, although the average increase over the four-hour period at Manning was tempered somewhat by the introduction of traffic-responsive ramp meters one-third of the way through the project. Table 5.8 lists the average ramp delays recorded during the four peak morning hours at the four eastbound ramps which were observed most often as the project progressed: Lincoln, Overland, Manning, and Robertson. Average delays are shown for each third of the 21-week project, as well as for the period preceding the project.

Table 5.8 shows the effects of both time of day and project duration on ramp delays at the four sample ramps. Metering rates were significantly lengthened at each of these ramps with the introduction of the Diamond Lanes. The average cycle time (defined as the length of the red signal plus two seconds of a green signal to permit auto passage) over the peak period increased from 5 seconds to 6 seconds at the Lincoln on-ramp; from 7.5 seconds to 16.8 seconds at the Overland on-ramp; from 10 seconds to 18.5 seconds at the Manning on-ramp; and from 12 seconds to 20 seconds at the Robertson on-ramp. These rate increases were accompanied by significant increases in ramp delays, particularly during the first week of the project as motorists adjusted their driving patterns to the new metering rates. Once the confusion and adjustments of the first week were past, however, few changes in ramp delays were observed during the peak hour between 7:00 and 8:00 A.M.; this was generally true at all eastbound ramps. That is, during the hour of heaviest usage, ramp delays did not improve as the project progressed. Delays experienced over the full four-hour morning peak period were reduced somewhat at the Lincoln, Overland, and Manning on-ramps as the project progressed, however. Reductions were particularly striking at the Overland and Manning ramps, where traffic-responsive ramp meters cut delays significantly during the more lightly-traveled portions of the morning peak (before 7:00 A.M. and after 9:00 A.M.). These reductions at the fringes of the morning peak period caused

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*Measured at the .05 level of significance.

TABLE 5.8: HOURLY EASTBOUND RAMP DELAYS

(Average Ramp Delay in Minutes Over Length of Project)

Ramp	Time of Measurement	6AM - 7 AM	7AM - 8AM	8AM - 9AM	9AM - 10AM	Peak Period Average
Lincoln (Two-Lane Metering)	Average Before Project	0.33	2.31	2.36	0.69	1.92
	First Seven Weeks	2.85	5.44	3.06	2.39	3.47
	Second Seven Weeks	0.99	3.51	4.32	2.71	2.88
	Third Seven Weeks	0.75	4.76	1.96	2.23	2.43
	Average During Project	1.16	4.14	3.47	2.53	2.83
Overland (Two-Lane Metering)	Average Before Project	2.22	3.55	4.25	3.31	3.29
	First Seven Weeks	1.83	5.76	6.79	4.92	4.58
	Second Seven Weeks*	1.47	5.19	5.92	3.33	3.98
	Third Seven Weeks*	0.69	6.21	5.20	2.67	3.69
	Average During Project	1.29	5.59	5.68	3.38	3.98
Manning (Right-Lane Preferential Bypass)	Average Before Project	0.29	3.44	3.18	0.38	2.38
	First Seven Weeks	3.90	8.61	7.55	7.40	6.87
	Second Seven Weeks*	1.61	8.69	8.24	3.86	5.63
	Third Seven Weeks *	1.13	8.77	5.08	2.24	4.30
	Average During Project	1.82	8.70	7.10	3.90	5.40
Robertson (One-Lane Metering)	Average Before Project	0.48	4.05	4.65	1.69	3.35
	First Seven Weeks	3.71	7.96	3.93	1.65	4.28
	Second Seven Weeks	2.73	7.72	5.62	2.14	4.50
	Third Seven Weeks	2.20	7.48	6.85	3.00	4.88
	Average During Project	3.08	7.78	5.08	2.10	4.47

*Traffic-responsive ramp meters installed.

corresponding reductions in the average delays recorded for the four-hour morning peak. Robertson experienced a slight increase in delay time over the course of the project: delay time improve- in the first two hours of the morning, but markedly worsened from 8:00 to 10:00 A.M. over the 21 weeks of the Diamond Lane demonstration.

At each of the eastbound ramps with a bypass lane for carpools and buses, the amount of time saved by using the ramp bypass exceeded the amount of time saved by traveling in the Diamond Lane from the on-ramp to downtown Los Angeles. That is, the total delays imposed on single-occupant automobiles by the on-ramps were greater than those imposed by the Diamond Lane itself. More detailed comparisons of delays encountered on ramps and on the freeway itself may be found in Section 5.4.

5.3.1.2 <u>Ramp Queues</u> - In addition to changing ramp delays, the changing metering rates and traffic patterns on the eastbound Santa Monica Freeway also changed the lengths of the queues waiting at each eastbound on-ramp. During the peak hour (7:00 to 8:00 A.M.), nine eastbound on-ramps experienced increased queue lengths (although the percentage increase in queue length was typically not so great as the percentage increase in waiting time). At five ramps, queue lengths decreased. (At four of these ramps --Washington, La Brea northbound, Crenshaw, and Arlington -- entrance volumes and wait time also decreased. As postulated, several former users of these easterly ramps probably chose to travel on adjacent surface streets.) Queue lengths during the peak period (6:00 to 10:00 A.M.) increased at six ramps, while decreasing at eight ramps. Table 5.9 lists the average peak period and peak-hour queue lengths at each eastbound entry ramp before and during the Diamond Lane project. The approximate storage capacity of each ramp also appears in this table. When this storage capacity is exceeded, traffic from the on-ramp spills over onto adjacent streets, and may interfere with the passage of through traffic.

There was no eastbound ramp at which the maximum queue length observed either before or during the project failed to exceed ramp capacity. That is, at some point during the period of observation, the queues at each eastbound ramp overflowed onto surface streets. A comparison of average peak-hour queue lengths with ramp capacities shows that such spillovers commonly occurred at several of the ramps studied. Table 5.9 shows the average peak-hour queue lengths on eastbound entry ramps during the Diamond Lane project exceeded the ramp storage capacity at seven locations:

Lincoln Boulevard;
Cloverfield Boulevard
Overland Avenue;
Robertson Boulevard;
Venice Boulevard;
Washington Boulevard; and
Crenshaw Boulevard.

TABLE 5.9: EASTBOUND RAMP QUEUE LENGTH STATISTICS

Eastbound Ramp	Peak Period (6-10 AM)				Peak Hour (7-8 AM)				Maximum** Observed Queue Car Lengths		Ramp Cap. No. of Cars
	MEAN		DIFFERENCE		MEAN		DIFFERENCE				
	Before	During	Increase (Decrease)	% Change	Before	During	Increase (Decrease)	% Change	Before	During	
* Lincoln	23.08	28.90	+5.82	25.22	27.66	40.43	+12.77	46.17	68	138	33
◇L Cloverfield	0.00+	15.16	75.16	00	0.00+	25.85	+25.85	00	0+	82	25
Centinela	2.96	10.36	+7.40	250.00	4.70	16.25	+11.55	245.74	22	27	27
◇L Bundy	9.44	14.43	+4.99	52.86	13.21	21.31	+8.10	61.32	22	36	27
Overland	25.18	14.89	(-10.29)	40.87	27.45	20.15	(-7.30)	26.59	70	46	20
◇R Manning	18.76	17.94	(-0.82)	4.37	27.08	28.46	+1.38	5.10	75	54	34
Robertson	17.44	16.62	(-0.82)	4.70	20.45	23.96	+3.51	17.16	35	38	18
La Cienega	9.13	7.88	(-1.25)	13.69	13.04	15.00	+1.96	15.03	42	19	20
◇L Venice	8.67	8.90	+0.23	2.65	13.27	14.42	+1.15	8.67	30	21	13
Washington	29.64	11.93	(-17.71)	59.75	36.70	20.83	(-15.87)	43.24	100	33	18
La Brea Northbound	19.03	7.83	(-11.20)	58.85	30.72	15.41	(-15.31)	49.84	54	28	18
◇L Crenshaw	17.67	14.61	(-3.06)	17.32	25.63	25.11	(-0.52)	2.03	50	38	20
Arlington	6.22	2.83	(-3.39)	54.50	8.94	4.83	(-4.11)	45.97	32	15	18
◇R Western	3.85	6.43	+2.58	67.01	3.72	8.82	+5.10	137.10	30	25	16
Normandie	4.33	NA	NA	NA	6.71	NA	NA	NA	20	NA	12
◇R Vermont	1.66	4.36	+2.70	162.65	2.94	4.67	+1.73	58.84	11	20	18
Hoover	7.27	NA	NA	NA	10.53	NA	NA	NA	28	NA	13

*Two-lane metering
◇ L or R: Left or right preferential bypass lane

*NOTE: Because far more observations were made during the project than before the project, strict comparisons of maximum observed queues "before" and "during" cannot be made. The greater number of observations during the project ensures that there is a greater probability that a higher maximum will be recorded during the project.

+NOTE: Ramp meters at Cloverfield were not turned on until the beginning of the project; thus no waits were recorded before the project's start.

At six locations (the latter five ramps listed above and La Brea northbound), average peak-hour queues also exceeded ramp storage capacities prior to the demonstration project.

The danger of exceeding ramp storage capacity is that traffic on adjacent surface streets may be adversely affected. In an attempt to determine whether the queue length increases accompanying the Diamond Lane project had slowed traffic on access streets, the evaluation plan called for the measurement of speeds on the north-south streets in the vicinity of the Santa Monica Freeway. Responsibility for these measurements was accepted by the Los Angeles Department of Traffic (LADT). In a June 14 report to the Mayor of Los Angeles and the Chairman of the Traffic and Off-Street Parking Committee,[4] S.S. Taylor, the head of LADT, indicated that speeds on a sampling of north-south routes during the morning peak period had decreased by 8% in the northbound direction and 1.5% in the southbound direction. These findings are reported in more detail in Section 5.2.3.2. Apparently, the speeds on north-south arterials were not affected adversely by the project, neither by ramp overflows nor by the signal changes made to facilitate the flow of east-west traffic.

The queue length statistics displayed in Table 5.9 shed some light on one of the pre-project concerns regarding the effect of the Diamond Lane project on surface street traffic. Left turns were permitted from surface access streets onto Freeway entrance ramps at three of the eastbound ramps with preferential bypass lanes to the left of the metered lane. Prior to the project, it was feared that increasing queue lengths at these three ramps -- Cloverfield, Bundy and Crenshaw -- would make it difficult for general traffic to complete left turns into the metered lane, and that this difficulty would increase the congestion experienced by southbound traffic on the three affected streets. To minimize this congestion, only vehicles with two or more occupants were permitted to turn left onto the Cloverfield, Bundy and Crenshaw on-ramps during the peak morning hours. These left-turn restrictions were the source of some conflict between CALTRANS and LADT. On April 8, City Traffic Engineer S.S. Taylor resolved the conflict unilaterally by removing the restrictions along with similar restrictions on certain westbound ramps.

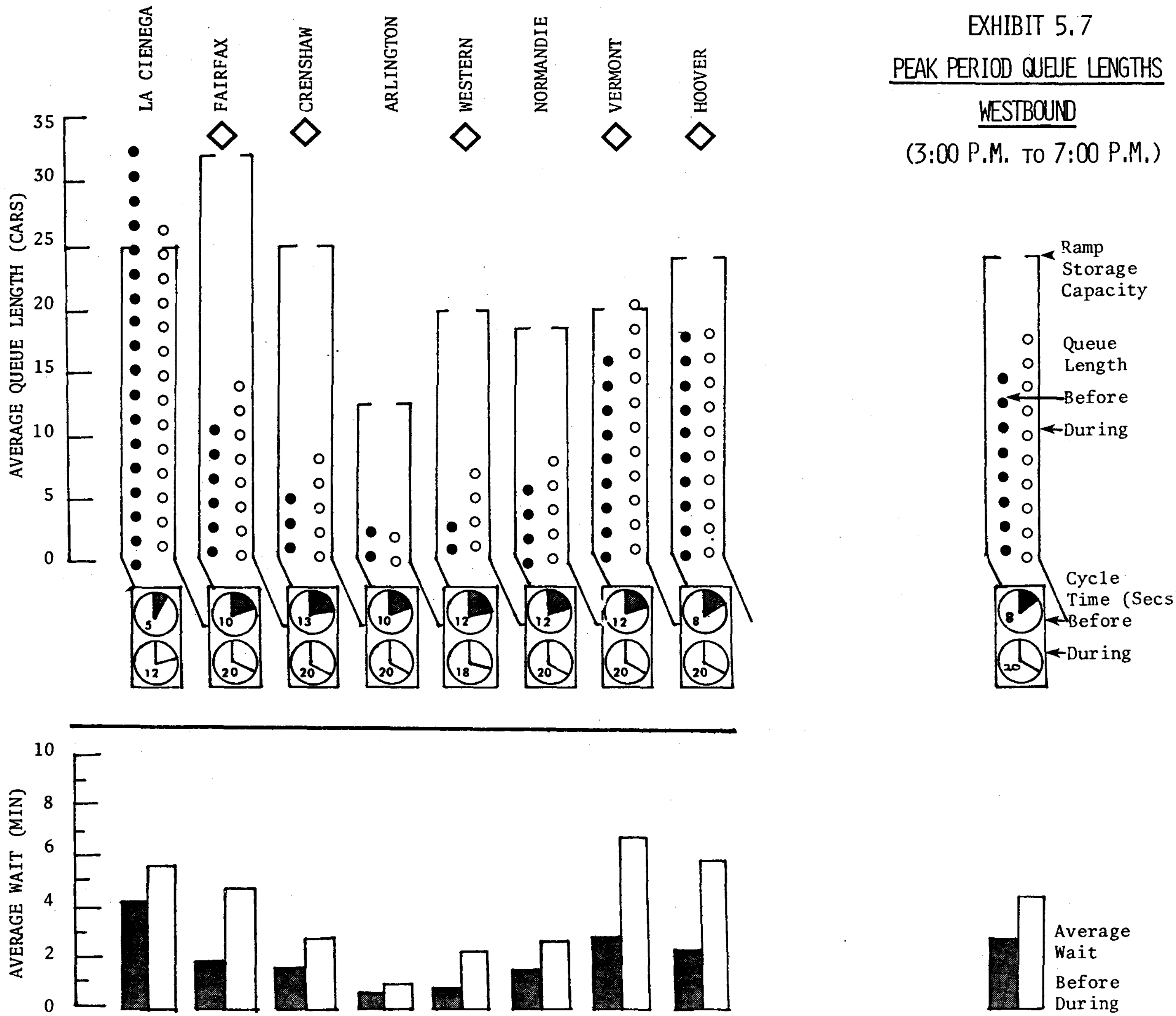
Table 5.9 shows that average queue lengths at Crenshaw Boulevard actually decreased with the Diamond Lane project. At Bundy, where considerable experimentation with metering rates and traffic control was undertaken during the winter of 1975, an increase of five car lengths was observed. Thus, the conditions facing drivers turning left onto these two ramps were not much different during the project than they were prior to the project. At Cloverfield, ramp meters were not used until the initiation of the Diamond Lane project, when they caused traffic to form an average queue slightly longer than the length of the ramp during the peak hour. At the June 3, 1976 meeting of the Joint Project

EXHIBIT 5.7

PEAK PERIOD QUEUE LENGTHS

WESTBOUND

(3:00 P.M. TO 7:00 P.M.)



Board, CALTRANS and the LADT mutually agreed that the anticipated problems at these on-ramps had failed to materialize, primarily because queue lengths had not increased dramatically beyond the storage capacity of the on-ramps.

5.3.2 Westbound Ramps

Exhibit 5.7 shows the queue lengths, metering rates, and average delays experienced during the peak period between 3:00 and 7:00 P.M. on the westbound ramps of the Santa Monica Freeway before and during Diamond Lane operation.* Methods of computation are the same as those explained in Section 5.3.1 for Exhibit 5.6. Subsequent subsections discuss in more detail the waiting times, meter rates, and queue lengths displayed in Exhibit 5.8. The data yield comparisons of waiting times before and during the project, and include the maximum waiting time recorded during any five-minute observation period on each ramp.

5.3.2.1 Waiting Times - Waiting times were recorded at eight of the fourteen westbound entry ramps before and during the project. As shown in Table 5.10, statistically significant** increases in peak period waiting times were observed at all of these eight ramps as a result of the metering changes and traffic shifts accompanying the project.

The largest measured peak-period increases in westbound ramp delays were observed at the Vermont (a 4.0-minute increase, 141% above pre-project delays), Hoover (a 3.7-minute increase, 167% over pre-project delays), and Fairfax/Washington (a 3.0-minute increase, 164% over pre-project delays) on-ramps. Table 5.11 shows the average ramp delays recorded during the evening peak period at the two westbound ramps observed most often as the project progressed: Hoover and La Cienega. The table lists average delays for each third of the 21-week project, as well as for the period preceding the project.

Table 5.11 demonstrates the effects of time of day and project duration on ramp delays for the two sample ramps. Metering rates were substantially lengthened at each of these ramps with the intro-

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*Peak-period statistics, rather than peak-hour statistics, will be used for westbound ramps. Severe deficiencies in the "before" peak-hour data limit their usefulness; these problems must be noted as they also affect peak-period data. Peak-period "before" data were generally collected from 3:45 PM to 6:15 PM. The limited collection period deleted much of both the first and last hours of the four-hour period, probably resulting in overly high estimates of peak-period queues and waiting times before the project. Since only one day of data collection was made for each westbound ramp before the project, the serviceability of this before data is questionable, and it was impossible to develop a meaningful hour-by-hour breakdown of waiting times and queue lengths.

**Measured at the .05 level of significance.

TABLE 5.10

WESTBOUND RAMP WAITING TIME STATISTICS (IN MINUTES)

Westbound Ramp		Peak Period (3-7 PM)				Maximum Observed Wait	
		Mean		Difference			
		Before	During	Increase (Decrease)	% Change	Before	During
◇ R	Hoover	2.20	5.87	+3.67	166.82	6.00	13.33
◇ L	Vermont	2.86	6.88	+4.02	140.56	NA	15.33
	Normandie	1.15	2.60	+1.45	126.09	5.10	8.33
◇ L	Western	0.83	2.16	+1.33	160.24	NA	6.60
	Arlington	0.62	0.87	+0.25	40.32	NA	3.33
◇ L	Crenshaw	1.30	2.74	+1.44	110.77	NA	9.67
◇ R	Washington/Fairfax	1.80	4.76	+2.96	164.44	NA	11.00
	La Cienega	4.08	5.62	+1.54	37.75	6.00	15.17

◇ L or R: Left or right preferential bypass lane.

TABLE 5.11: HOURLY WESTBOUND RAMP DELAYS

(Average Ramp Delay in Minutes Over Length of Project)

Ramp	Time of Measurement	3PM - 4PM	4PM - 5PM	5PM - 6PM	6PM - 7PM	Peak Period Average
04 Hoover	Average Before Project	0.37	1.79	3.52	2.10	2.20
	First Week					
	First Seven Weeks	9.48	7.92	4.79	4.84	6.79
	Second Seven Weeks	7.25	7.50	5.50	3.79	6.05
	Third Seven Weeks	5.48	6.38	5.16	3.65	5.16
	Average During Project	7.01	7.19	5.27	3.90	5.87
10 La Cienega	Average Before Project	NA	3.58	5.52	3.14	4.08
	First Week					
	First Seven Weeks	10.43	9.13	1.27	2.22	5.76
	Second Seven Weeks	9.14	8.15	2.19	2.56	5.53
	Third Seven Weeks	9.98	9.23	2.25	1.28	5.69
	Average During Project	9.63	8.84	2.05	2.07	5.62

duction of the Diamond Lanes. The average cycle time over the peak period (3:00-7:00 P.M.) increased from 8 to 12 seconds at the La Cienega on-ramp and from 8 to 20 seconds at the Hoover on-ramp. These rate increases were accompanied by significant increases in ramp delays, particularly during the first 7-week period of the project as motorists adjusted their driving patterns to the new metering rates. As the project progressed, ramp delays at Hoover improved over the entire peak period. At La Cienega, the peak period ramp delays decreased from the first seven-week period to the second, and then increased again, with a small overall decrease by the 21st week. At both ramps, the hours during which peak delays were experienced appeared to shift to earlier time periods with the implementation of the project.

5.3.2.2 Ramp Queues - Changes in metering rates and traffic patterns, introduced with the commencement of the Diamond Lanes, resulted not only in increased ramp delays, but also in generally increased queue lengths. As with eastbound traffic, percent increases in queue lengths were less than those in waiting time. Table 5.12 lists the average peak period wait at each westbound entry ramp before and during the project; the storage capacity of each ramp and maximum observed queue length during the project are also noted. At all studied westbound on-ramps except Arlington, the maximum observed queue length during the project exceeded ramp capacity.* However, such spillovers commonly occurred at only two westbound ramps: La Cienega and Vermont. Average peak period queue lengths show that at the La Cienega ramp queue lengths exceeded ramp capacity both before and during the project, decreasing, however, by about six cars after initiation of the Diamond Lanes. Vermont peak period average queue lengths increased by about four cars when the project began, so that ramp capacity was exceeded by almost one car. Maximum increases in queue lengths (amounting to about four cars) over the four-hour peak period occurred at Vermont and Fairfax.

As in the case of the three eastbound ramps discussed in Section 5.3.1.2, three westbound ramps -- Vermont, Western, and Crenshaw -- were thought to pose a potential problem to drivers making left turns into the ramp. Each of these three freeway entrance ramps have preferential bypass lanes to the left of the metered lane. Concern was expressed that increased queue lengths would hinder attempts to turn left into the metered lane, thus further aggravating congestion problems on these streets. To avoid this potential problem, use of the left-turn lane was limited to vehicles with two or more occupants (i.e., those that could use the preferential bypass lanes) during peak afternoon hours at Vermont, Western, and Crenshaw westbound ramps. As previously noted, left-turn problems were not so great as anticipated, and these restrictions terminated on April 8.

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*Problems related to exceeding ramp storage capacity are discussed in Section 5.3.1.2.

TABLE 5.12: WESTBOUND RAMP QUEUE LENGTH STATISTICS

Westbound Ramp	Peak Period (3 - 7 PM) MEAN NO. OF CARS Before	Peak Period (3 - 7 PM) MEAN NO. OF CARS During	DIFFERENCE Increase (Decrease)	DIFFERENCE % Change	Maximum Observed Queue Car Lengths Before	Maximum Observed Queue Car Lengths During	Ramp Capacity No. of Cars
◇R Hoover	17.42	17.65	+0.23	1.32	72	40	24
◇L Vermont	16.30	20.65	+4.35	26.69	NA	46	20
Normandie	5.34	7.81	+2.47	46.25	NA	25	18
◇L Western	3.15	7.21	+4.06	128.89	17	22	20
Arlington	3.00	2.62	(-0.38)	12.67	NA	10	12
◇L Crenshaw	5.05	8.23	+3.18	62.97	NA	29	25
◇R Washington/Fairfax	10.24	14.29	+4.05	39.55	NA	33	32
La Cienega	32.31	26.45	(-5.86)	18.14	72	65	25

◇ L or R: Left or Right Preferential Bypass Lane

5.4 TOTAL TRIP TIMES

The two preceding sections of this chapter have dealt separately with driving time and ramp delays on the Santa Monica Freeway. In this section, the two will be combined to present a comprehensive picture of total trip time on the Santa Monica Freeway before and during the project. Total trip time will be examined for eastbound A.M. peak period travelers (from several on-ramps to Grand Avenue) and for westbound P.M. peak period travelers (from several on-ramps to Lincoln Boulevard).

Differences in total trip time by the freeway and by the surface streets will also be noted. Several specific trips, from the area of the freeway's western end to downtown Los Angeles, have been selected and travel times for these trips have been computed via the freeway and also via surface streets. Such a comparison of times will suggest whether travel by surface streets was beneficial to any of those persons commuting to downtown Los Angeles during the Diamond Lane project.

Average peak period ramp delays and travel times were used in constructing total travel times for comparison purposes. Since freeway travel times improved over the length of the project, this averaging process tends to understate freeway speeds. However, the use of peak period statistics instead of peak-hour statistics has a counterbalancing effect, since before/after differences in freeway travel and speeds were more pronounced during the peak hour of morning and evening travel than is reflected by average values compiled over the entire seven-hour period of Diamond Lane operation.

5.4.1 Total Freeway Trip Times

Eastbound A.M.

Table 5.13E displays the total trip times for eastbound drivers on the Santa Monica Freeway by number of people per car. The trip times reflect average driving times plus average ramp delays from each of 15 on-ramps to Grand Avenue, and are listed for the period preceding ramp metering, preceding the project, and during the project. The percent increase (or decrease) in travel time from the pre-project period to the project period is also shown. These differences are depicted graphically in Exhibit 5.8E.

For the single driver, travel time increased with the initiation of the Diamond Lanes at 12 on-ramps. Increases averaged around three minutes, being higher at the westerly end of the freeway. At three* ramps (Washington, La Brea northbound, and Arlington), single drivers experienced a minimal decrease of less than one minute in travel time, as decreases in ramp delays outweighed driving time increases. At two of these ramps, Washington

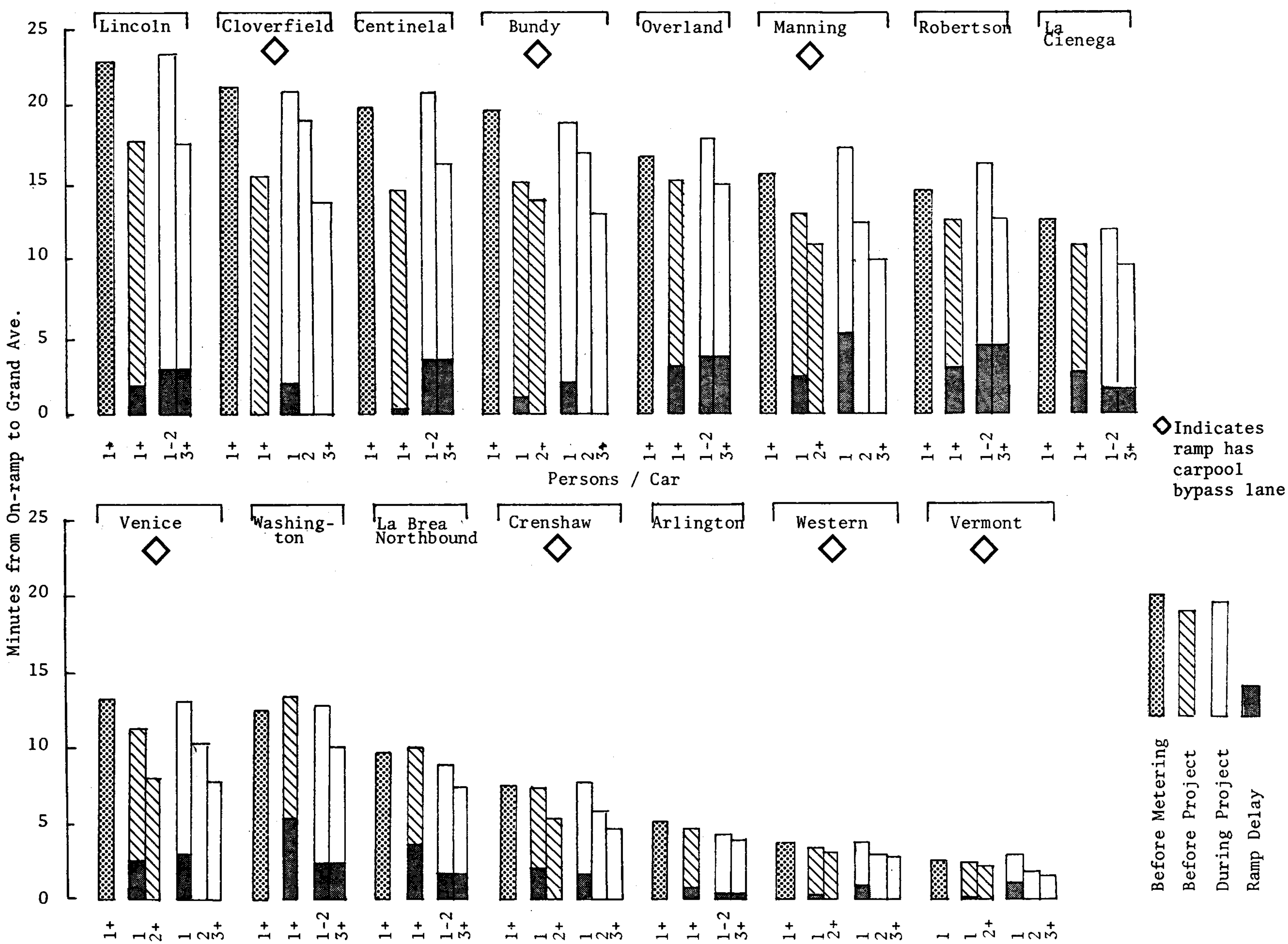
*Data not available for Normandie and Hoover.

TABLE 5.13E: EASTBOUND A.M. AVERAGE PEAK PERIOD TOTAL TRAVEL TIMES (IN MINUTES)

(Meter Delay and Driving Time from On-Ramp to Grand Avenue)

Location	Single-Person (1) Before Ramp Metering	Single-Person (2) ◆ Before Lane	Single-Person (3) ◆ During Lane	Single-Person (4) % Increase (Decrease) 2-3	Two-Person Carpool (1) Before Ramp Metering	Two-Person Carpool (2) ◆ Before Lane	Two-Person Carpool (3) ◆ During Lane	Two-Person Carpool (4) % Increase (Decrease) 2-3	Three-Person Carpool (1) Before Ramp Metering	Three-Person Carpool (2) ◆ Before Lane	Three-Person Carpool (3) ◆ During Lane	Three-Person Carpool (4) % Increase (Decrease) 2-3
Lincoln	22.65	17.62	23.03	+31%	22.65	17.62	23.03	+31%	22.65	17.62	17.53	(-1%)
Cloverfield	21.38	15.38	20.87	+36%	21.38	15.38	18.85	+23%	21.38	15.38	13.77	(-10%)
Centinela	19.88	14.51	20.69	+43%	19.88	14.51	20.69	+43%	19.88	14.51	16.12	+11%
Bundy	19.61	15.05	19.03	+26%	19.61	14.00	16.97	+21%	19.61	14.00	12.49	(-11%)
Overland	16.81	15.10	17.97	+19%	16.81	15.10	17.97	+19%	16.81	15.10	14.42	(-5%)
Manning	15.57	13.22	17.71	+34%	15.57	10.84	12.31	+14%	15.57	10.84	9.95	(-8%)
Robertson	14.57	13.29	16.11	+21%	14.57	13.29	16.11	+21%	14.57	13.29	13.30	0%
La Cienega	13.23	10.95	13.64	+25%	13.23	13.64	11.80	+25%	13.23	10.95	9.44	(-14%)
Venice	13.14	10.94	12.88	+18%	13.14	7.92	10.12	+28%	13.14	7.92	7.78	(-2%)
Washington	12.31	13.38	12.51	(-7%)	12.31	13.38	12.51	(-7%)	12.31	13.38	10.00	(-25%)
La Brea (NB)	9.60	9.95	9.05	(-9%)	9.60	9.95	9.05	(-9%)	9.60	9.95	7.53	(-24%)
Crenshaw	7.32	7.28	7.35	+1%	7.32	5.24	5.65	+8%	7.32	5.24	4.66	(-11%)
Arlington	5.21	4.76	4.39	(-8%)	5.21	4.76	4.39	(-8%)	5.21	4.76	3.90	(-18%)
Western	3.86	3.35	3.82	+14%	3.86	3.09	2.98	(-4%)	3.86	3.09	2.80	(-9%)
Vermont	2.41	2.21	2.75	+24%	2.41	2.07	1.86	(-10%)	2.41	2.07	1.75	(-15%)

EXHIBIT 5.8E: TRAVEL TIMES FROM ON-RAMP TO GRAND AVE.
EASTBOUND A.M. PEAK PERIOD



and La Brea, travel times had increased for the single driver with the introduction of ramp metering. For the most part, however, ramp metering resulted in a net decrease in total travel times.

Once on the freeway, driving time was the same for 1- and 2-passenger cars. However, the two-person carpool could avoid a ramp delay at several of the on-ramps by using the bypass lane, and thus save time. At five of the seven on-ramps with carpool bypasses*, travel time increased with the commencement of the Diamond Lanes. Increases, however, averaged about two minutes -- one minute less than for the single-passenger automobile. At the two most easterly on-ramps with bypass lanes -- Western and Vermont -- travel time decreased minimally (less than .25 minute in each case).

At 13 of the 15 measured eastbound on-ramps, carpools with three or more passengers experienced a decrease in travel time with the initiation of the Diamond Lanes, so that travel times were less than both pre-ramp metering and pre-project travel times. Decreases from pre-project to project times averaged slightly over one minute, with larger decreases felt by those persons traveling longer distances (i.e., entering at the westerly on-ramps). No change occurred at the Robertson on-ramp, while travel time increased at Centinela, where the increased meter delay offset the advantage gained from using the Diamond Lane to travel to the Los Angeles CBD.

Westbound P.M.

Total travel times for westbound drivers are listed in Table 5.13W and graphed in Exhibit 5.8W. The travel times combine average driving time and average ramp delay from each of eight on-ramps to Lincoln Boulevard.** Pre-project and project travel times are presented, along with the percent increase (or decrease) in travel time between these two periods.

Single drivers realized an increase in travel time at all on-ramps. The increase averaged 2.85 minutes, increases at eastern ramps being higher than average. Travel time for two-person carpools also increased at all ramps except at Fairfax, with an average increase of 2.49 minutes. At Fairfax, the travel time decreased very slightly (.04 minute).

Travel times decreased substantially (decreases averaging 1.42 minutes or about 11%) for westbound carpools of three or more people, at all ramps except La Cienega. At La Cienega, where ramp delays were very high and no bypass lane existed, the travel time increased by a little over 1/2 minute (6%).

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*These on-ramps are listed in Section 5.3 and are indicated with a diamond in Exhibit 5.8E.

**These trips do not parallel the chosen eastbound A.M. trips as return trips from the downtown Los Angeles area, but do permit comparisons of total travel times, with representation of various westbound on-ramp delays.

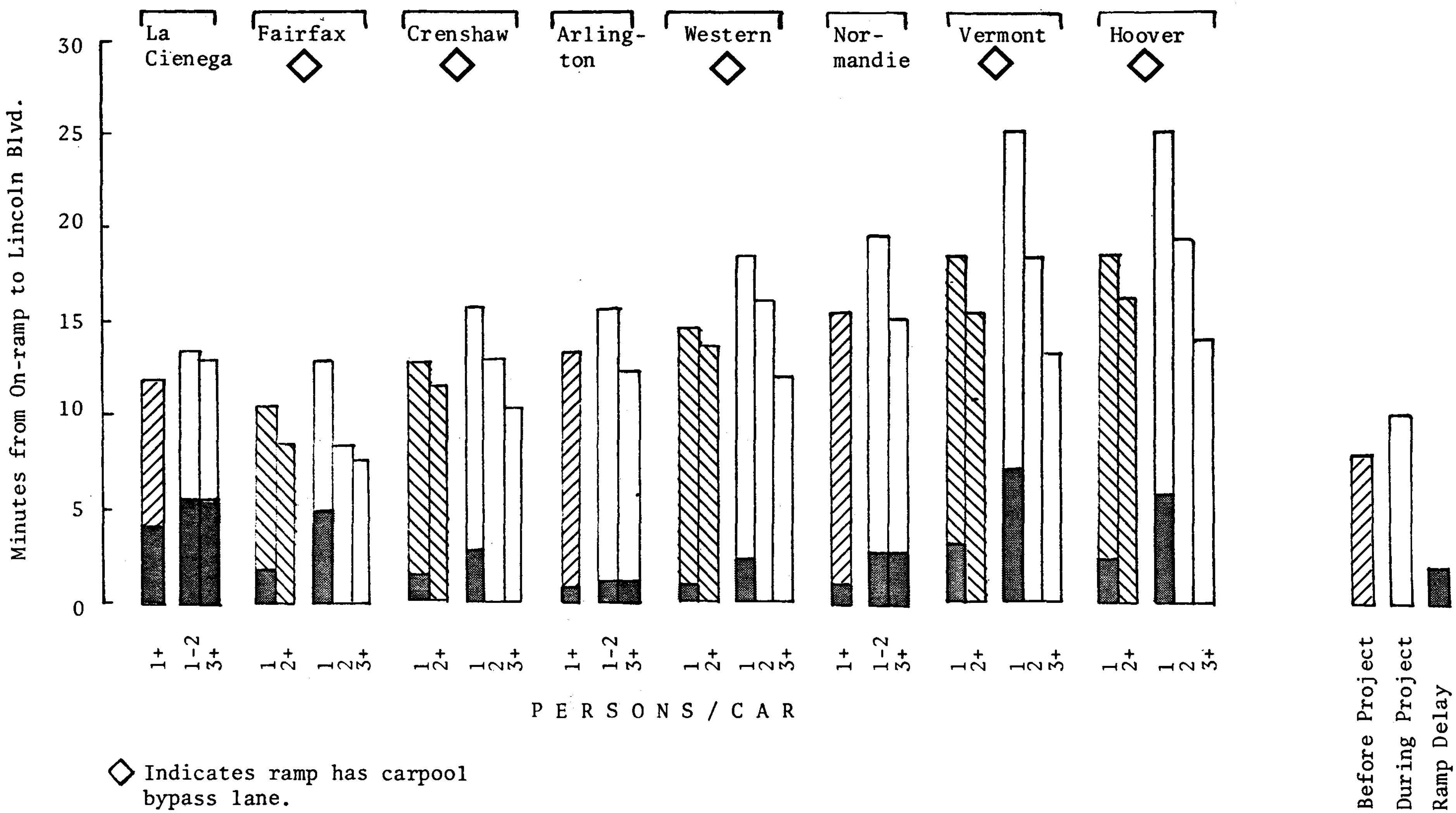
TABLE 5.13W

WESTBOUND P.M. PEAK PERIOD TOTAL TRAVEL TIMES (IN MINUTES)

(Meter Delay and Driving Time from On-Ramp to Lincoln Boulevard)

Location	Single Person			Two-Person Carpool			Three+-Person Carpool		
	◆ Before Lane	◆ During Lane	% Increase (Decrease)	◆ Before Lane	◆ During Lane	% Increase (Decrease)	◆ Before Lane	◆ During Lane	% Increase (Decrease)
Hoover	18.45	25.19	+37%	16.25	19.32	+19%	16.25	13.99	(-14%)
Vermont	18.24	25.14	+38%	15.38	18.26	+19%	15.38	13.32	(-13%)
Normandie	15.58	19.61	+26%	15.58	19.61	+26%	15.58	15.19	(-3%)
Western	14.43	18.24	+26%	13.60	16.08	+18%	13.60	11.95	(-12%)
Arlington	13.40	15.72	+17%	13.40	15.72	+17%	13.40	12.11	(-10%
Crenshaw	12.79	15.68	+23%	11.49	12.94	+13%	11.49	10.13	(-12)
Fairfax	10.26	13.18	+28%	8.46	8.42	0%	8.46	7.52	(-11%)
La Cienega	11.97	13.20	+10%	11.97	13.20	+10%	11.97	12.66	+6%

EXHIBIT 5.8W: TRAVEL TIMES FROM ON-RAMP TO LINCOLN BLVD.
(WESTBOUND P.M. PEAK PERIOD)



◇ Indicates ramp has carpool bypass lane.

5.4.2 Total Trip Times By Route and Mode

The comparisons in the preceding subsections focus on total freeway trip times from the entry ramp to the exit ramp. In addition, an allowance must be made at either end of the trip to account for the time spent getting to the freeway from the trip's starting point and the time spent traveling from the freeway exit ramp to the trip's destination. In an attempt to explore the effect of the Diamond Lanes on total trip times, fourteen sample trips were generated, starting at a variety of locations within the Westside study area and ending at Flower and Eighth Street in the Los Angeles CBD. This destination was near the employment centroid of the CBD, based on the study of downtown work locations conducted in 1975.[5] The fourteen sample trip origins are mapped in Exhibit 5.9.

For each of the sample trip origins, travel time to Flower and 8th in the Los Angeles CBD was computed for a variety of routes and modes. Total trip times were computed for both freeway and surface street travel by carpoolers and non-carpoolers. Trip times by bus were also computed for eastbound travel before and after the Diamond Lane demonstration.

Table 5.14 shows morning peak period travel times from 14 intersections to downtown Los Angeles via the Santa Monica Freeway, parallel surface streets, and public transit before and during the Diamond Lane demonstration. Comparisons of surface street and Santa Monica Freeway travel times before the project can be made, as can comparisons of surface street travel times and differing travel times of 1-, 2-and 3-occupant cars on the freeway during the project. For single-occupant automobiles, travel over surface streets during the project was quicker than freeway travel from three of the chosen intersections. From Robertson and Burton Way, travel by surface streets was faster for both single drivers and carpoolers that could utilize the Diamond Lanes. From Airdrome and La Cienega, travel by surface streets benefitted the car carrying one or two persons; however, those eligible to use the Diamond Lanes could reach the downtown area faster by doing so from this intersection. Travel from Motor and Manning by surface streets benefitted the single driver.

At Robertson and Burton Way, travel time via the surface streets was also quicker before the initiation of the Diamond Lanes. Travel time on the surface streets was also better from Via Marina and Admiralty before the project, but increased so that during the project trips via the Santa Monica Freeway were quicker.

In general, trips originating further (west) from the downtown area could be made much quicker by the freeway than by surface streets. The benefit of travel at high speeds decreased as trip distance decreased, while ramp delays increased as a percentage of trip time with decreased distance. Travel times from the more easterly origins by freeway and by surface streets showed small differences.

EXHIBIT 5.9

TOTAL TRAVEL TIMES:
LOCATION OF ON-RAMPS AND INTERSECTIONS

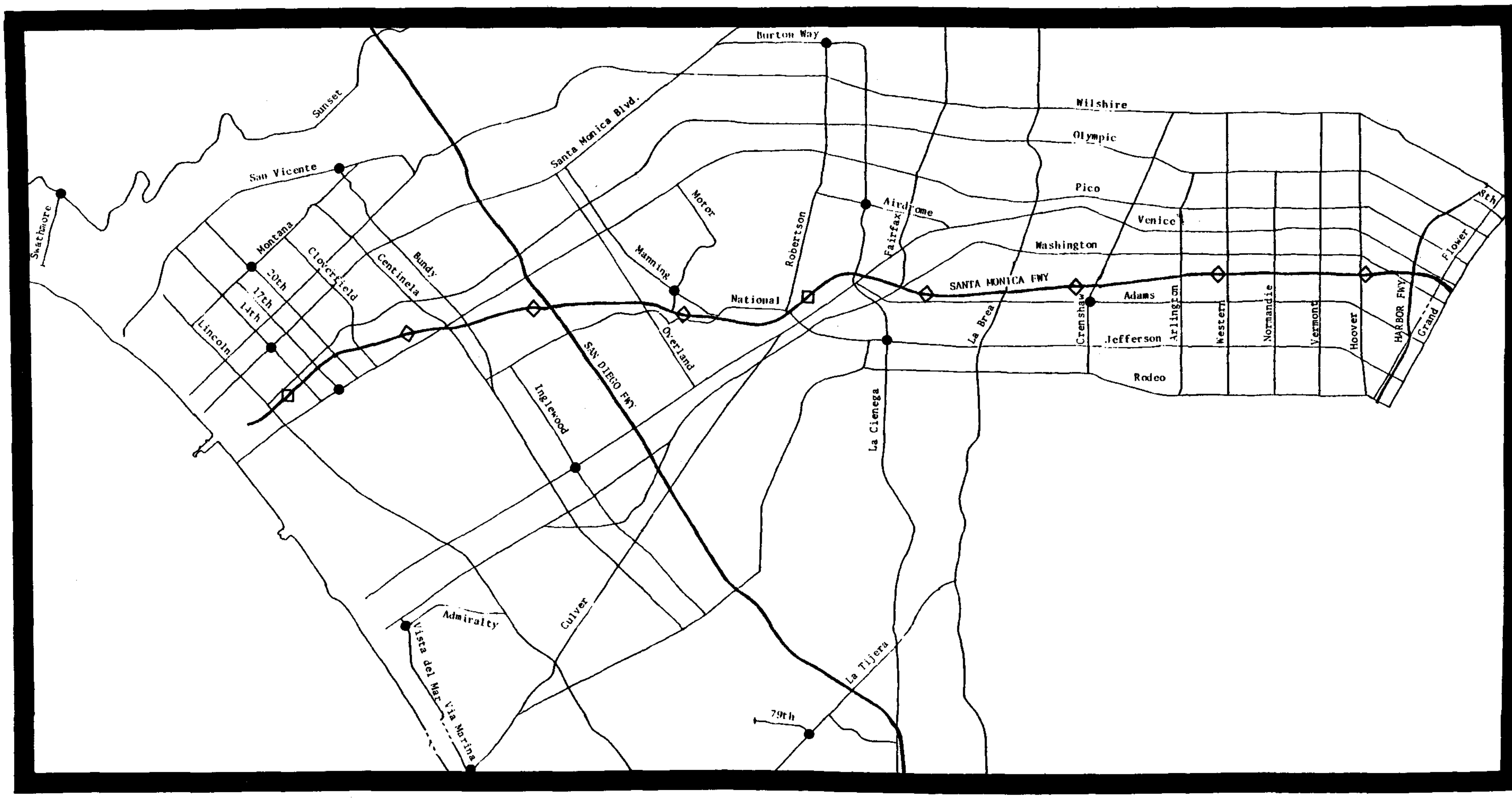


TABLE 5.14: TOTAL EASTBOUND A.M. TRIP TIMES: COMPARISON OF SM FWY., SURFACE STREET AND BUS TRAVEL TIMES FROM SELECTED INTERSECTIONS TO DOWNTOWN L.A. (FLOWER & EIGHTH)

Intersection of Trip Origin	Via Santa Monica Freeway: Before ◊ Lane		Via Santa Monica Freeway: During ◊ Lane			Via Surface Streets		Bus	
	Pref. On-Ramp Lanes	Non-Pref. On-Ramp Lanes	1 Person	2 Persons	3+ Persons	Before Lane	During Lane	Before Lane Spring '75*	During Lane
Sunset and Swarthmore	no	30.59	34.45	34.45	30.34	44.33	44.90	89	50
Bundy and San Vicente	no	22.11	25.58	25.58	21.47	35.85	36.03	79	38
20th and Montana	no	20.74	27.05	25.03	20.21	40.03	40.08	84	38
14th and Santa Monica	no	19.97	26.24	24.22	19.40	31.53	33.16	69	37
17th and Pico	no	18.84	25.06	23.04	18.22	31.34	32.76	64	36
Inglewood and Venice	no	22.76	25.73	25.73	22.19	26.76	26.66	44	37
Via Marina and Admiralty	no	32.69	33.16	33.16	30.65	31.54	34.94	46	46
Culver & Vista del Mar	no	31.82	32.10	32.10	29.59	32.67	34.70	46	37
79th and La Tijera	no	26.83	28.27	28.27	25.91	28.30	28.54	44	27
Jefferson and La Cienega	no	15.88	16.82	16.82	14.46	17.88	17.61	39	16
Airdrome and La Cienega	no	15.88	16.82	16.82	14.46	16.80	16.56	39	24
Robertson and Burton Way	no	20.57	21.73	21.73	19.37	19.53	18.90	41	32
Motor and Manning	15.18	17.56	22.11	16.71	14.35	22.34	19.82	54	23
Crenshaw and Adams	8.65	10.69	10.78	9.08	8.09	13.10	13.86	NA	23
Average Over All Sample Locations	---	21.92	24.70	23.76	20.62	28.00	28.46	56.76	33.14

*Source: SCRTD Demonstration Grant Application

Table 5.14 also shows the travel times by bus from the intersections to downtown Los Angeles.* Before the project, travel by bus required more time than by freeway or surface streets in all instances examined; during the project, however, the bus provided a faster means of transport from two intersections (79th and La Tijera, and Jefferson and La Cienega) than either the surface streets or the non-preferential lanes. More details on bus system operation and ridership may be found in Chapter 6.

5.4.3 Perceived Trip Travel Times

Some typical trip statistics from the Santa Monica Freeway Corridor User Survey are summarized in Table 5.15. These statistics reflect the perceived travel times and distances reported by survey respondents. The average peak period trip for all survey respondents was 21 miles long, and took 37.4 minutes in the morning and 43.2 minutes in the evening. These times correspond to average effective trip speeds of 34.0 miles per hour and 29.5 miles per hour, respectively, where effective trip speed is defined as the average trip length divided by the average travel time. This average trip length is more than twice the national average home-to-work trip length of 9.9 miles.**

As shown in Table 5.15, freeway users' trip lengths average 6.5 miles longer than city street users' trip lengths, and three-person carpoolers' trip lengths average 3.7 miles longer than non-carpoolers. Carpoolers are defined as respondents who usually drive with two or more persons for their most frequent trip in the Santa Monica Freeway Corridor. There are also differences in effective trip speeds between these groups. For example, the freeway users' average trip speed is 6.8 miles per hour faster than city street users during the morning peak. This difference is much smaller between carpoolers and non-carpoolers. However, carpools with three or more people reported a greater trip speed than either non-carpoolers or the average freeway user.

The Santa Monica Freeway Corridor Users Survey asked respondents to specify what conditions of their usual trip changed during the operation of the Diamond Lanes. These conditions included starting time, travel time, and length of both the A.M. and P.M. trip. The perceived trip changes are summarized in Table 5.16 for freeway users versus city street users, 2- and 3-person carpoolers versus non-carpoolers, and overall drivers. The average change in trip length is positive, but less than one mile for all groups.

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*These travel times do not include an allowance for the delay encountered in the initial wait for the bus. Each trip made prior to the project that would require a transfer, however, was assessed a five-minute penalty for each transfer required. During the project, bus schedules were matched to determine the actual delays incurred by transferring riders.

**Federal Highway Administration, Nationwide Personal Transportation Study, Report #8, Home-to-Work Trips and Travel, NTIS Report PB-242-892, August 1973.

TABLE 5.15: TYPICAL PERCEIVED TRIP STATISTICS

Corridor Driver Classification	Average Trip Length (miles)	Average A.M. Trip Travel Time (Min.)	Average A.M. Trip Effective Speed (mph)	Average P.M. Trip Travel Time (Min.)	Average P.M. Trip Effective Speed (mph)
Freeway User (85%)	22.0	38.4	34.9	44.6	30.6
City Street User (15%)	15.5	31.6	28.3	36.5	24.9
Two-Person Carpoolers (8%)	23.4	39.9	35.6	47.1	30.8
Three-or-More-Person Carpoolers (4%)	24.4	39.7	37.6	45.6	32.0
Non-Carpooler (88%)	20.7	37.2	33.6	42.8	29.7
Average Overall Survey Respondents (100%)	21.0	37.4	34.0	43.2	29.9
Weighted Average, Overall Survey Respondents	21.87	38.22	34.63	44.27	30.28

TABLE 5.16: PERCEIVED TRIP CHANGES

Corridor Driver Classification	A.M. PEAK TRIP CHANGES Length (Miles)	A.M. Start Time (Min.)	A.M. Travel Time (Min.)	P.M. PEAK TRIP CHANGES Length (Miles)	P.M. Start Time (Min.)	P.M. Travel Time (Min.)
Freeway User (85%)	+.8	-5.8	+8.9	+.8	+1.0	+9.8
City Street User (15%)	+.4	-2.3	+4.4	+.5	-.3	+5.4
Two-Person Carpoolers (8%)	+.8	-3.9	+8.5	+.8	-.2	+9.9
Three-or-More-Person Carpoolers (4%)	+.4	-.5	-1.5	+.4	+.5	-1.3
Non-Carpooler (88%)	+.7	-5.3	+8.3	+.8	+.8	+9.4
Arithmetic Average Overall Survey Respondents	+.7	-5.0	+7.9	+.8	+.80	+9.0
Weighted Average Overall Survey Respondents	.69	-4.3	7.09	.75	.50	8.16

The average change in trip starting time due to the Diamond Lanes was 5.0 minutes earlier in the morning and 0.8 minutes later in the evening. These figures indicate that people generally started 5 minutes earlier to get to work on time in the morning but did not stay at work longer and probably could not leave work earlier in the evening. The perceived increase in travel time was 7.9 minutes during the peak morning hours. For work trips, this change is consistent with change in starting time. The P.M. travel time increase was reported to be slightly greater than the A.M. increase with an average of 9.0 minutes.

Freeway users changed their A.M. starting times more than city street users, and non-carpoolers adjusted more on the average than carpoolers. Similarly, travel times increased more for freeway users than city street users, and non-carpoolers reported much greater increases in travel times than 3-person carpoolers, who reported a collective travel time decrease of 1.5 minutes per trip.

The 1.5-minute savings reported by 3-person carpools is consistent with the measured savings indicated by the investigation of total trip times reported in Sections 5.4.1 and 5.4.2. However, the eight- and nine-minute average delays reported by non-carpooling freeway users appear to be somewhat higher than freeway measurements indicate is possible. A breakdown of the delays reported by individual respondents show that 3.2% of all respondents reported eastbound travel time increases in excess of 30 minutes, while 4.5% reported westbound increases of over 30 minutes. Freeway measurements make it seem extremely unlikely that the Diamond Lane consistently cost any traveler more than 30 minutes per day. In comparing pre-project and project travel times, the largest average driving time penalty imposed on a non-carpooler traveling the full length of the Diamond Lanes was on the order of 7.5 minutes during the height of the morning and evening peak (see Table 5.3). Similarly, the largest average increase in ramp waiting times was approximately five minutes during the most heavily traveled hour (5.4 minutes at Hoover westbound, 5.3 minutes at La Cienega westbound and Manning eastbound, and 5.0 minutes at Centinela eastbound). Combining these average delays, a consistent loss of over 30 minutes seems impossible, and a daily loss as high as 15 minutes would be suspect. There is no question, however, that the Diamond Lanes may have caused isolated delays in excess of 15 or even 30 minutes on a particularly bad day. Thus, a number of explanations may account for the unusually high reports of perceived travel time penalties noted by drivers responding to the corridor user survey. Some drivers may have remembered and reported instances of extreme delays rather than average delays, others undoubtedly perceived the Diamond Lane's time penalties as being greater than they actually were, while still others may have been motivated by a desire to cast an obviously unpopular project in the worst possible light by providing an exaggerated estimate of project-inflicted delays.

5.5 FREEWAY TRAFFIC VOLUMES

The changes in travel speeds experienced during the Diamond Lane demonstration were accompanied by significant shifts in traffic patterns. The total number of vehicles and people using the Santa Monica Freeway dropped markedly during the early weeks of the demonstration, and then rose steadily. The early decline in freeway traffic reflected a combination of carpool formation, growing bus ridership, and defection to surface streets by non-carpoolers. By the close of the demonstration, ridership levels at the easternmost segments of the freeway were within 2% of approaching pre-project levels, while vehicle volumes had declined by approximately 10%.

A variety of different measurements were made to trace the change in traffic volumes before and during the Diamond Lane project. Electronic freeway sensors recorded vehicle volumes in both the Diamond Lanes and other lanes on a daily basis, while observers noted vehicle occupancy rates at the designated screenlines before and after project implementation. The greatest number of visual observations were made at the Western Avenue screenline, when Diamond Lane occupancy rates were measured weekly, and occupancy rates in non-carpooling lanes were sampled during 13 of the project's 21 weeks. At other screenlines, occupancy rates were generally observed prior to the project and during the first week following implementation. Plans to record occupancy rates at these other screenlines during the fall of 1976 were thwarted by the early closing of the demonstration. In addition to the computerized records of vehicle volumes and the visual observations of vehicle occupancy rates, the survey of corridor drivers conducted during the fall of 1976 helped to illuminate the changes in travel patterns accompanying Diamond Lane implementation. This subsection examines these changes, tracing the development of traffic volumes over time as the demonstration progressed, and exploring the shifts in passenger vehicle movement by direction, screenline, time of day, route and freeway lane.

5.5.1 Overview of Total Usage: Vehicles, Persons, and Occupancy Rate

Table 5.17 lists vehicles, travelers, occupancy rates, and Diamond Lane usage measured at the Crenshaw Boulevard* sensor stations

*The Crenshaw Boulevard sensors were the set of freeway sensors nearest the Western Avenue screenline that provided the most reliable traffic volume data for all freeway lanes. A set of sensors at Gramercy Place, only one-quarter mile from Western Avenue, were closer to the screenline than the Crenshaw sensors, which were roughly 1-1/2 miles from the screenline. The loop detectors at Gramercy Place proved to be more erratic than the Crenshaw sensors, however, and the detector in the eastbound Diamond Lane at Gramercy was inoperative for most of the demonstration. Moreover, the recording of freeway traffic volumes at Western Avenue and Gramercy Place was further confused by the tendency of drivers to use the collector roads at that point as a freeway bypass route. Since no collector roads existed at the location of the Crenshaw sensors, these sensors were not only more reliable but also more easily interpreted than the Gramercy sensors. Accordingly, traffic volumes measured at the Crenshaw sensors were used in combination with the Western Avenue screenline counts to develop a picture of traffic volumes at the eastern end of the Diamond Lanes. Occupancy counts made at Crenshaw Boulevard in 1975 were used to reflect the before condition in the westbound direction.

TABLE 5.17

AVERAGE DAILY VEHICLE AND PASSENGER STATISTICS

FOR CRENSHAW BOULEVARD

(Seven-Hour Peak Periods, Both Directions of Travel)

Statistic	Before Project	First Seven Weeks	Second Seven Weeks	Final Seven Weeks
Total Vehicles	113,135	76,738	97,197	101,678
Total People	138,873	101,643	128,180	136,421
Bus Ridership*	1,171	3,092	3,569	3,810
Passengers/Vehicle (including buses)	1.23	1.32	1.32	1.34
Passengers/Vehicle (automobiles only)	1.22	1.29	1.28	1.31
Diamond Lane Carpools	--	3,879	3,955	4,497
Non-Diamond Lane Carpools	3,479	466	968	1,252
Total Carpools	3,479	4,345	4,923	5,749

*SCRTD and SMMBL buses only.

prior to the project and in each of the three seven-week periods during the life of the demonstration. Prior to the start of the Diamond Lane demonstration, a combined average of 113,135 vehicles crossed the Crenshaw Boulevard sensors in all Santa Monica Freeway lanes during the seven-hour period between 6:30 and 9:30 A.M. and between 3:00 and 7:00 P.M. During the first seven weeks of the project, this number dropped by 32 percent to 76,738 vehicles. By the second seven-week period, the average number of vehicles had risen to within 14 percent of the preproject level and during the last seven weeks of the project an average of 101,678 vehicles crossed the Crenshaw Boulevard sensors, 10.1 percent less than the pre-project levels.

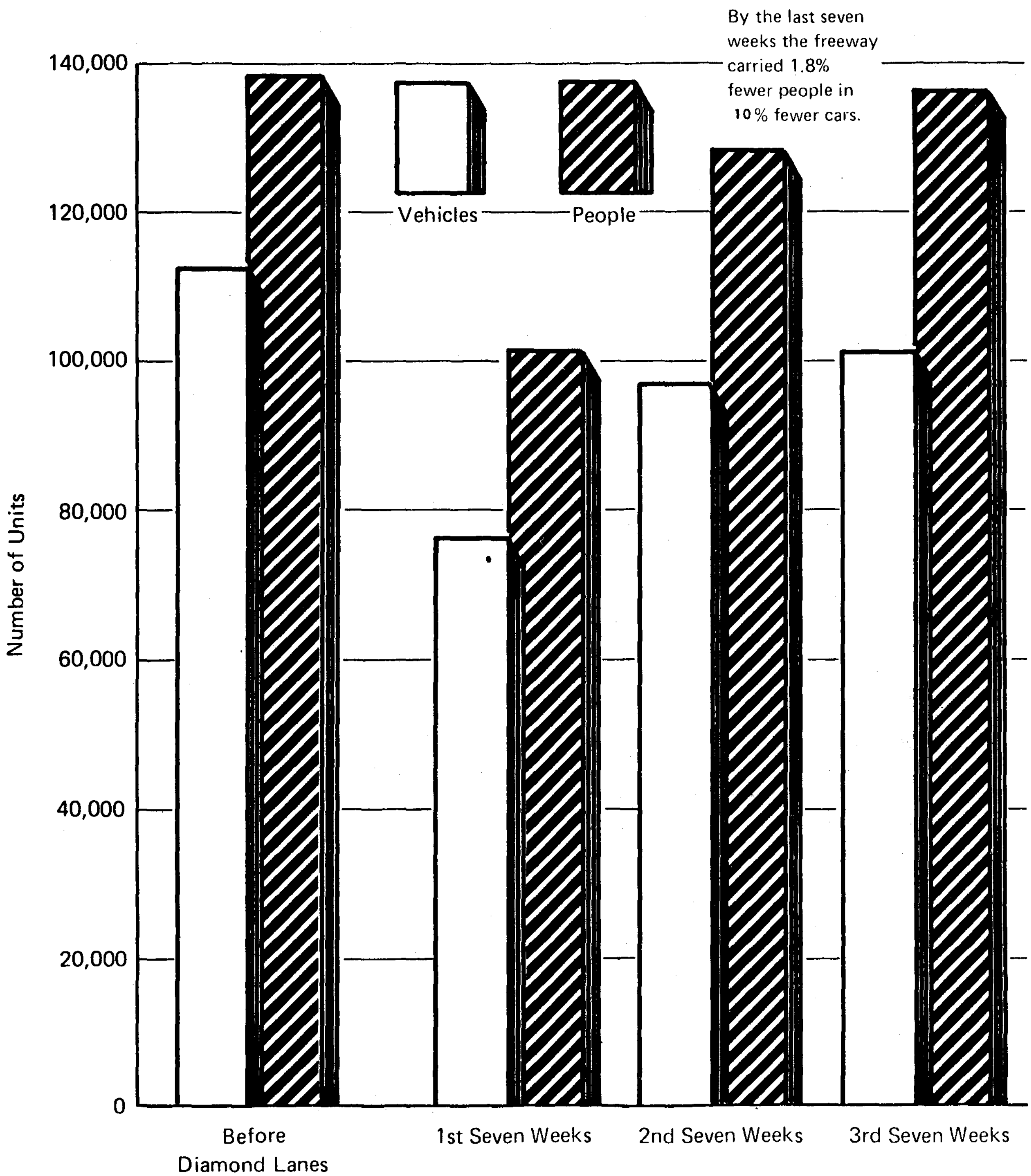
The total number of travelers, or passengers, in all vehicles (including buses) passing Crenshaw Boulevard on all freeway lanes during the seven-hour peak period was estimated to be 138,873 prior to the initiation of the Diamond Lanes. This average number dropped by 27 percent during the first seven weeks of the project, to 101,643 passengers. The second seven-week period saw an average passenger level of 128,180, a level which rose to 136,421, or 1.8% below the pre-project average during the last seven-week period. Thus, during the last seven weeks of the demonstration's life, the freeway carried 1.8% fewer people in 10.1% fewer vehicles at Crenshaw Boulevard. The increase in vehicles and passenger travel over time is depicted graphically in Exhibit 5.10.

The change in vehicle occupancy rates reflects the relationship between the change in the number of vehicles and the change in the number of persons using the freeway during Diamond Lane operating hours. Prior to the project, each automobile using the freeway carried an average of 1.22 persons; that is, every five cars carried approximately six persons. Automobile occupancy rates rose to 1.29 passengers per car during the first seven weeks of the demonstration, dropped slightly below this level during the second seven-week period, and rose again to 1.31 passengers per car during the last seven weeks of the demonstration, which roughly paralleled the summer vacation period. This last occupancy level represents a 7.4 percent increase over the pre-project level of 1.22 passengers per automobile. The increase in vehicle occupancy rates is even more striking when buses and bus occupancies are introduced to the accounting system. From a pre-project occupancy rate of 1.23 passengers per vehicle, the occupancy rate including both bus and auto passengers rose to 1.34 passengers per vehicle by the last seven weeks of the project, an increase of 8.9 percent over the starting rate.

EXHIBIT 5.10

VEHICLE AND PEOPLE THROUGHPUT AT CRENSHAW BOULEVARD

Santa Monica Freeway: 7 Hours, Both Directions



5.5.2 Volumes by Direction

Table 5.18 lists vehicles, travelers, occupancy ratio, and bus and carpool usage of the Crenshaw Boulevard sensor station by time of day and direction of travel. Data in the peak directions of travel reflect volume measurement and occupancy counts made before and during the Diamond Lane demonstration. Although vehicle volumes and Diamond Lane occupancies were recorded for comparable periods in the off-peak directions of travel, no occupancy counts were made to record the number of passengers in cars moving in the nonpreferential lanes in the off-peak direction of travel. Accordingly, in constructing Table 5.18, it was assumed that vehicle occupancy rates for cars using the nonpreferential lanes were identical in the peak and off-peak travel direction for similar time periods.*

5.5.2.1 Peak Directions of Travel - Exhibit 5.11 plots vehicle and passenger movement in the peak directions of travel over the three seven-week periods comprising the demonstration project. For the eastbound trip to the CBD in the morning, neither vehicle nor passenger movement had reached pre-project levels by the last seven weeks of the project. By the last seven weeks, the freeway carried an average of 10% fewer people in 19% fewer vehicles in the eastbound direction between 6:30 and 9:30 A.M. Table 5.18 shows that vehicle volumes in this direction took a relatively large drop immediately following implementation, falling from 25,762 vehicles to 16,287 vehicles during the first seven weeks of the project, a drop of 36.8% Morning eastbound traffic volumes never fully recovered from this initial drop over the life of the demonstration.

For the westbound trip home from the CBD in the evening, passenger volumes never reached pre-project levels. By the last seven weeks, the freeway carried 7% fewer people in 16% fewer vehicles between 3:00 and 7:00 P.M. than it carried prior to the demonstration. Occupancy rates were higher for the westbound peak direction than for any other direction of travel, averaging 1.42 passengers/vehicle when project buses were counted. When westbound and eastbound travel in the peak directions are combined, a comparison of traveler movement before and during the project shows that by the last seven weeks the freeway was carrying 8.1% fewer people than it had carried prior to the project in 19% fewer vehicles in the peak direction.

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*This assumption was originally supported by past CALTRANS studies of vehicle occupancy levels in opposing lanes of the same freeway. However, occupancy counts made following the Diamond Lane demonstration in the off-peak direction on the Santa Monica Freeway suggest that occupancy levels are slightly higher in the off-peak direction (see Section 5.3). In the absence of documentation regarding occupancies before the project, there is no way of knowing whether the higher occupancies in the off-peak direction predated the project or resulted from relatively heavier carpool formation in the off-peak direction.

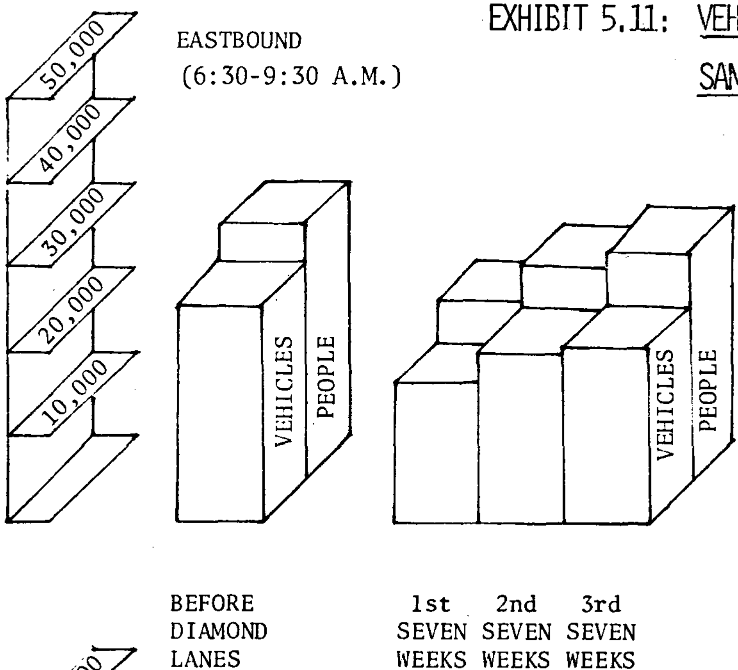
TABLE 5.18: AVERAGE DAILY VEHICLE AND MOVEMENT BY DIRECTION ON CRENSHAW BOULEVARD

	Before Project	Weeks 1-7	Weeks 8-14	Weeks 15-21
PEAK DIRECTIONS				
Eastbound/6:30-9:30 a.m.				
Total Vehicles	25,762	16,287	20,175	20,868
Total People	30,206	21,318	26,141	27,115
Bus Ridership	586	1,546	1,785	1,905
Passengers/Vehicle (Incl. Buses)	1.17	1.31	1.30	1.30
Passengers/Vehicle (Autos Only)	1.15	1.22	1.21	1.21
◇ Lane Carpools	--	664	626	706
Non- ◇ Lane Carpools	474	56	106	117
Total Carpools	474	720	732	823
Westbound/3:00-7:00 p.m.				
Total Vehicles	35,349	23,512	29,680	29,776
Total People	45,249	32,255	40,586	42,238
Bus Ridership	586	1,546	1,785	1,905
Passengers/Vehicle (Incl. Buses)	1.28	1.37	1.37	1.42
Passengers/Vehicle (Autos Only)	1.27	1.31	1.31	1.36
◇ Lane Carpools	--	1,332	1,375	1,482
Non- ◇ Lane Carpools	1,405	189	389	518
Total Carpools	1,405	1,521	1,764	2,000
OFF-PEAK DIRECTIONS				
Westbound/6:30-9:30 a.m.				
Total Vehicles	21,906	16,534	18,773	22,974
Total People	25,258	20,040	22,897	27,735
Passengers/Auto*	1.15	1.21	1.22	1.21
◇ Lane Carpools	--	516	537	617
Non- ◇ Lane Carpools	403	57	99	129
Total Carpools	403	573	636	746
Eastbound/3:00-7:00 p.m.				
Total Vehicles	30,118	20,405	28,569	28,060
Total People	38,160	28,030	38,556	39,333
Passengers/Auto*	1.27	1.37	1.35	1.40
◇ Lane Carpools	--	1,367	1,417	1,692
Non- ◇ Lane Carpools	1,197	164	374	488
Total Carpools	1,197	1,521	1,791	2,180

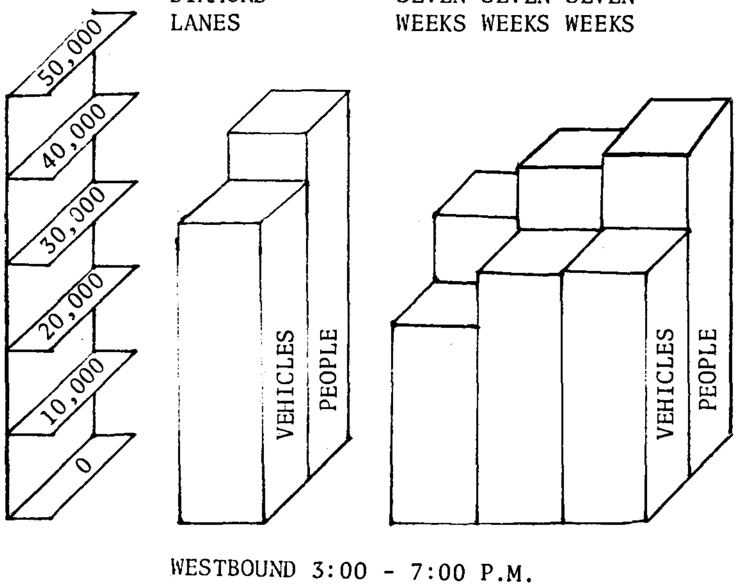
* Project bus ridership was insignificant in the off-peak directions.

EXHIBIT 5.11: VEHICLE AND PEOPLE THROUGHPUT AT CRENSHAW BOULEVARD

SANTA MONICA FREEWAY: PEAK DIRECTION OF TRAVEL

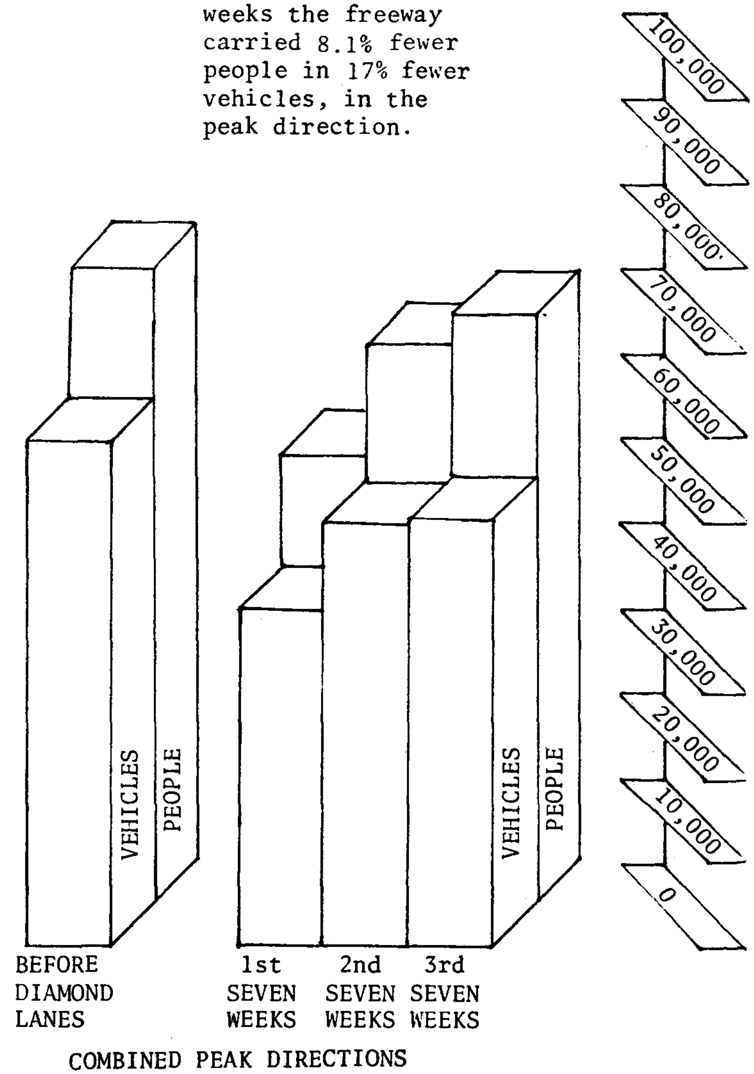


By the last seven weeks the freeway carried 10% fewer people in 19% fewer vehicles, eastbound.



By the last seven weeks the freeway carried 7% fewer people in 16% fewer vehicles, westbound.

By the last seven weeks the freeway carried 8.1% fewer people in 17% fewer vehicles, in the peak direction.



5.5.2.2 Off-Peak Directions of Travel - Directional trends on the Santa Monica Freeway are less pronounced than on most major freeways. Prior to the project, 46% of the total number of vehicles traveling during the morning peak were moving westbound, away from the CBD. In the evening, the difference in travel directions was even less pronounced, with 47.5% of the total vehicles traveling eastbound toward the CBD. Although project bus ridership in the off-peak direction was insignificant, the Diamond Lane project offered sufficient advantages to travelers in the off-peak direction to cause significant numbers of new carpools to be formed for westbound trips during the morning and eastbound trips during the evening. As a result, vehicle occupancy rates increased for off-peak travel as well as for peak travel. In the case of westbound traffic between 6:30 and 9:30 A.M., both vehicle and passenger levels during the last seven weeks of the demonstration exceeded pre-project averages. By the last seven weeks, the freeway carried 9.8% more passengers in 4.9% more vehicles in the westbound direction between 6:30 and 9:30 A.M. Comparable statistics for the eastbound direction between 3:00 and 7:00 P.M. show that the freeway carried 3.1% more people in 6.8% fewer vehicles in this off-peak direction.*

5.5.3 Volumes by Screenline

Occupancy counts were made far more frequently at the Western Avenue screenline than at other screenlines. At La Cienega Boulevard, occupancy measurements were made prior to the project and during the first and third weeks following implementation. Vehicle volumes in and out of the Diamond Lanes, on the other hand, were recorded by freeway sensors throughout the project. If it is assumed that vehicle occupancies in and out of the Diamond Lane did not vary at La Cienega Boulevard as the project progressed, it is possible to develop estimates of automobile and passenger throughput at this screenline for the three seven-week periods comprising the demonstration. Table 5.19 lists these estimates, which are similar in many ways to those developed for the Crenshaw Boulevard sensors and Western Avenue occupancy counts (see Table 5.18). On the basis of the estimates in Table 5.24, during the last seven weeks of the demonstration the Santa Monica Freeway carried 3% fewer people than were carried prior to the project at La Cienega Boulevard in 10% fewer vehicles.

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*Because of the assumptions made regarding occupancy rates in the off-peak directions, these figures regarding relative increases in passenger travel are less certain than those dealing with travel in the peak direction. To the extent that pre-project passenger throughput in the off-peak direction may have been understated by assuming that occupancies were identifical to those in the peak direction, the relative increases in passenger throughput may be slightly overstated. No such problems were encountered in computing relative changes in vehicle throughput, as vehicle volumes were counted in both peak and off-peak directions during both morning and evening peaks.

TABLE 5. 19: AVERAGE DAILY VEHICLE AND PASSENGER MOVEMENT BY DIRECTION ON LA CIENEGA BOULEVARD

	Before Project	Weeks 1-7	Weeks 8-14	Weeks 15-21
PEAK DIRECTIONS				
Eastbound/6:30-9:30 a.m.				
Total Vehicles	20,711	17,592	17,038	17,350
Total People	24,637	22,794	22,424	23,029
Bus Ridership	586	1,546	1,785	1,905
Passengers/Vehicle (Incl. Buses)	1.19	1.30	1.32	1.33
Passengers/Vehicle (Autos Only)	1.17	1.21	1.22	1.22
◆ Lane Carpools	--	561	561	561
Non ◆ Lane Carpools	449	115	111	113
Total Carpools	449	676	672	674
Westbound/3:00-7:00 p.m.				
Total Vehicles	29,701	23,240	23,884	24,063
Total People	37,315	31,279	32,269	32,989
Bus Ridership	586	1,546	1,785	1,905
Passengers/Vehicle (Incl. Buses)	1.26	1.35	1.35	1.37
Passengers/Vehicle (Autos Only)	1.24	1.28	1.28	1.30
◆ Lane Carpools	--	1,064	1,064	1,064
Non ◆ Lane Carpools	1,036	190	196	195
Total Carpools	1,036	1,254	1,260	1,259
OFF-PEAK DIRECTIONS				
Westbound/6:30-9:30 a.m.				
Total Vehicles	17,053	16,453	16,217	16,332
Total People	19,969	20,025	19,862	20,097
Passengers/Vehicle	1.17	1.22	1.22	1.23
◆ Lane Carpools	--	469	469	469
Non ◆ Lane Carpools	369	108	106	106
Total Carpools	369	577	575	575

Table 5.19
Average Daily Vehicle and Passenger
Movement by Direction on La Cienega Boulevard (Continued)

	Before Project	Weeks 1-7	Weeks 8-14	Weeks 15-21
OFF-PEAK DIRECTIONS (Continued)				
Eastbound/3:00-7:00 p.m.				
Total Vehicles	23,793	21,772	21,666	24,332
Total People	29,575	28,284	28,196	32,111
Passengers/Vehicle	1.24	1.30	1.30	1.32
◆ Lane Carpools	--	892	892	892
Non ◆ Lane Carpools	830	177	176	196
Total Carpools	830	1,069	1,068	1,088
TOTAL				
Vehicles	91,258	79,057	78,805	82,077
People	111,496	102,382	102,751	108,226
Bus Ridership	1,171	3,092	3,569	3,810
Passengers/Vehicle (Incl. Buses)	1.22	1.30	1.30	1.32
Passengers/Vehicle (Autos Only)	--	1.26	1.26	1.27
◆ Lane Carpools	--	2,986	2,986	2,986
Non ◆ Lane Carpools	2,684	590	589	610
Total Carpools	2,684	3,576	3,575	3,596

NOTE: During the project, occupancies in the main lanes and diamond lanes were sampled during weeks one and three only. Occupancies measured during these early weeks were assumed constant throughout the remainder of the demonstration.

Since no occupancy counts were made at La Cienega Boulevard during the period before the unexpected termination of the project, estimates of passenger throughput at this screenline are necessarily less sound than those made at Western Avenue. Further west along the freeway, at the Cloverfield Boulevard count station, occupancy data proved to be so sparse as to be unusable. Due to CALTRANS manpower shortages, a complete set of occupancy counts were not made at Cloverfield Boulevard prior to the project, and observations made during the first week of the project are biased by the presence of a large number of violators in the Diamond Lanes. In the absence of occupancy data, Table 5.20 presents vehicle volume counts at Cloverfield before and during the Diamond Lane project. This table shows that vehicle volumes at Cloverfield Boulevard, which is west of the San Diego Freeway near the ocean end of the Diamond Lanes, suffered less disruption as a result of the demonstration than the heavier volumes measured at the more easterly sensor stations at La Cienega Boulevard and at Crenshaw Boulevard. During the first seven weeks of the project, the total number of vehicles passing the Cloverfield screenline in all directions during Diamond Lane hours dropped from 54,679 vehicles to 50,041 vehicles, a decline of 8.5%. By way of contrast, average traffic volumes at La Cienega dropped from 91,258 vehicles before the project to 79,057 vehicles during the first seven weeks, a decline of 13.4%, while average volumes at Crenshaw Boulevard initially dropped from 113,135 vehicles to 76,738 vehicles, a decline of 32%. As might have been anticipated, then, the initial vehicle displacement increased as traffic moved nearer the CBD and vehicle volumes increased.

By the last seven weeks of the project, vehicle volumes at Cloverfield had climbed to within 5.8% of pre-project levels, and volumes in the off-peak directions actually exceeded pre-project levels. Further analysis of vehicle volumes at the different Santa Monica Freeway screenlines may be found in the following subsection, which traces screenline traffic patterns on an hour-by-hour basis.

5.5.4 Volumes by Time of Day

Exhibit 5.12E and 5.12W trace vehicle volumes in the eastbound and westbound directions, respectively, on the Santa Monica Freeway by time of day before and during the Diamond Lane demonstration. These volumes were recorded by loop detectors located at Crenshaw Boulevard, and depict declines in vehicle volumes accompanying Diamond Lane operating hours. The sharp drop in vehicle volumes in both directions with the introduction of Diamond Lane restrictions is particularly striking.

Exhibits 5.13 and 5.14 trace similar patterns for vehicle volumes at La Cienega and Cloverfield Boulevards, respectively. The changing traffic patterns recorded at the La Cienega sensors are similar to those recorded at the Crenshaw sensors, located 2.7 miles to the east along the freeway. At the Cloverfield sen-

TABLE 5.20: VEHICLE VOLUMES ON SANTA MONICA FREEWAY AT CLOVERFIELD BOULEVARD

	Before Project	Weeks 1-7	Weeks 8-14	Weeks 15-21
PEAK DIRECTIONS				
Eastbound/6:30-9:30 a.m.				
Main Lanes	14,007	11,216	11,139	11,067
◆ Lane	--	295	279	264
Total Vehicles	14,007	11,511	11,418	11,331
Westbound/3:00-7:00 p.m.				
Main Lanes	17,496	15,745	15,990	15,690
◆ Lane	--	549	542	635
Total Vehicles	17,496	16,294	16,532	16,325
OFF-PEAK DIRECTIONS				
Westbound/6:30-9:30 a.m.				
Main Lanes	9,097	9,059	8,900	9,332
◆ Lane	--	175	176	203
Total Vehicles	9,097	9,234	9,076	9,535
Eastbound/3:00-7:00 p.m.				
Main Lanes	14,079	12,462	12,823	13,435
◆ Lane	--	540	570	865
Total Vehicles	14,079	13,002	13,393	14,300
DAILY TOTAL				
Main Lanes	54,679	48,482	48,852	49,524
◆ Lane	--	1,559	1,567	1,967
Total Vehicles	54,679	50,041	50,419	51,491

EASTBOUND AND WESTBOUND TRAFFIC
TRAFFIC PATTERNS AT
CRENSHAW BOULEVARD

=Before Diamond Lanes (Mar, Apr, May, 1975)
=During Diamond Lanes (Apr, May, Jun, July, 19
=After Diamond Lanes (Oct, 1976)
=Diamond Lane Service Hours

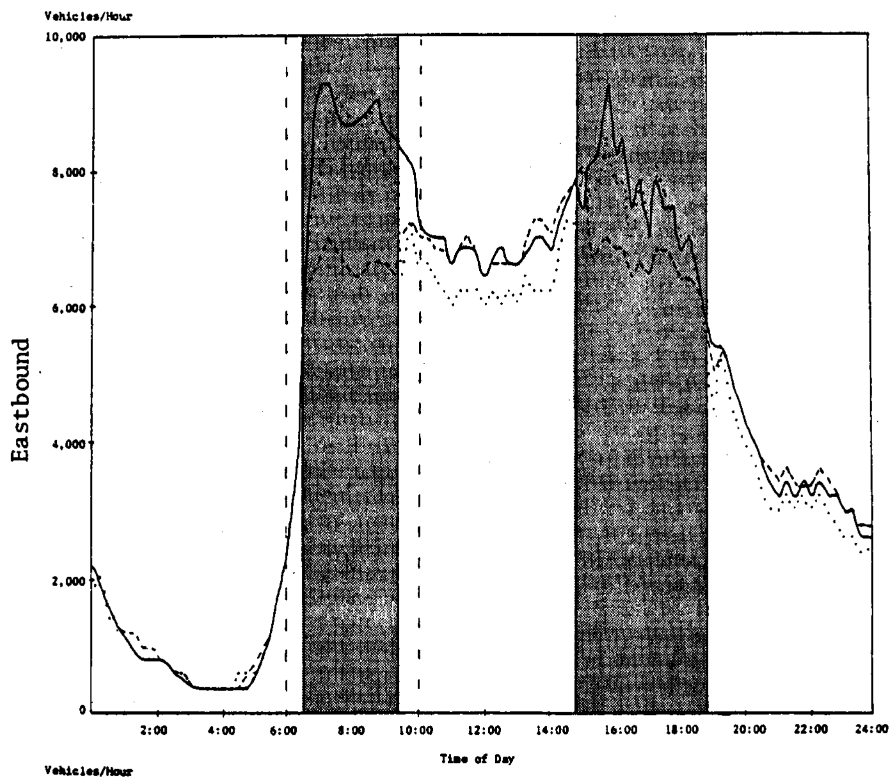


EXHIBIT 5.12E

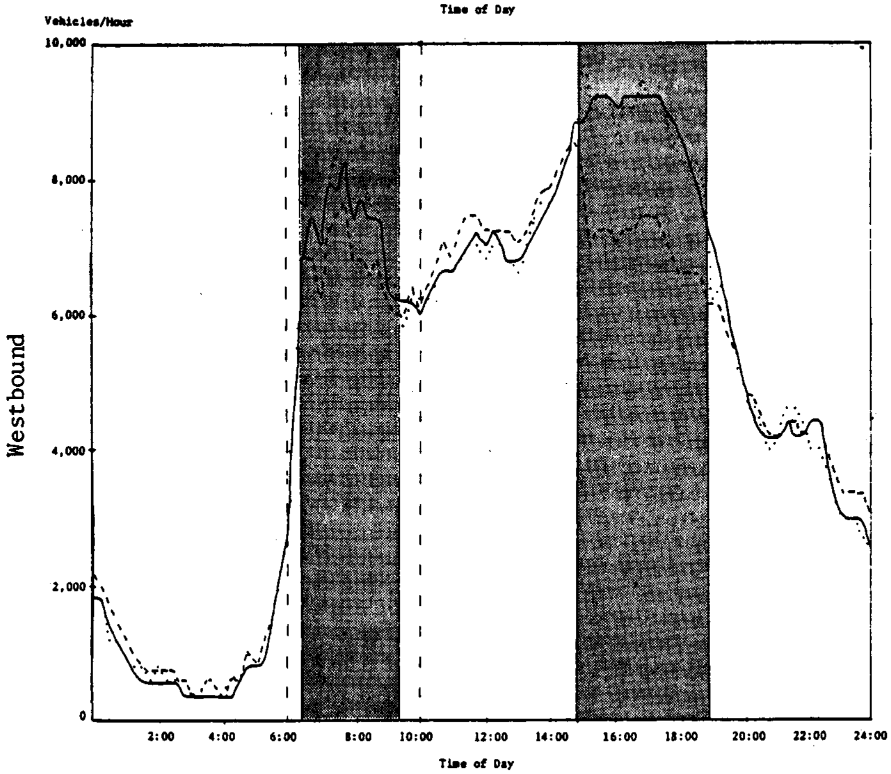


EXHIBIT 5.12W

EXHIBIT 5.13

COMPARISON OF TRAFFIC PATTERNS AT LA CIENEGA

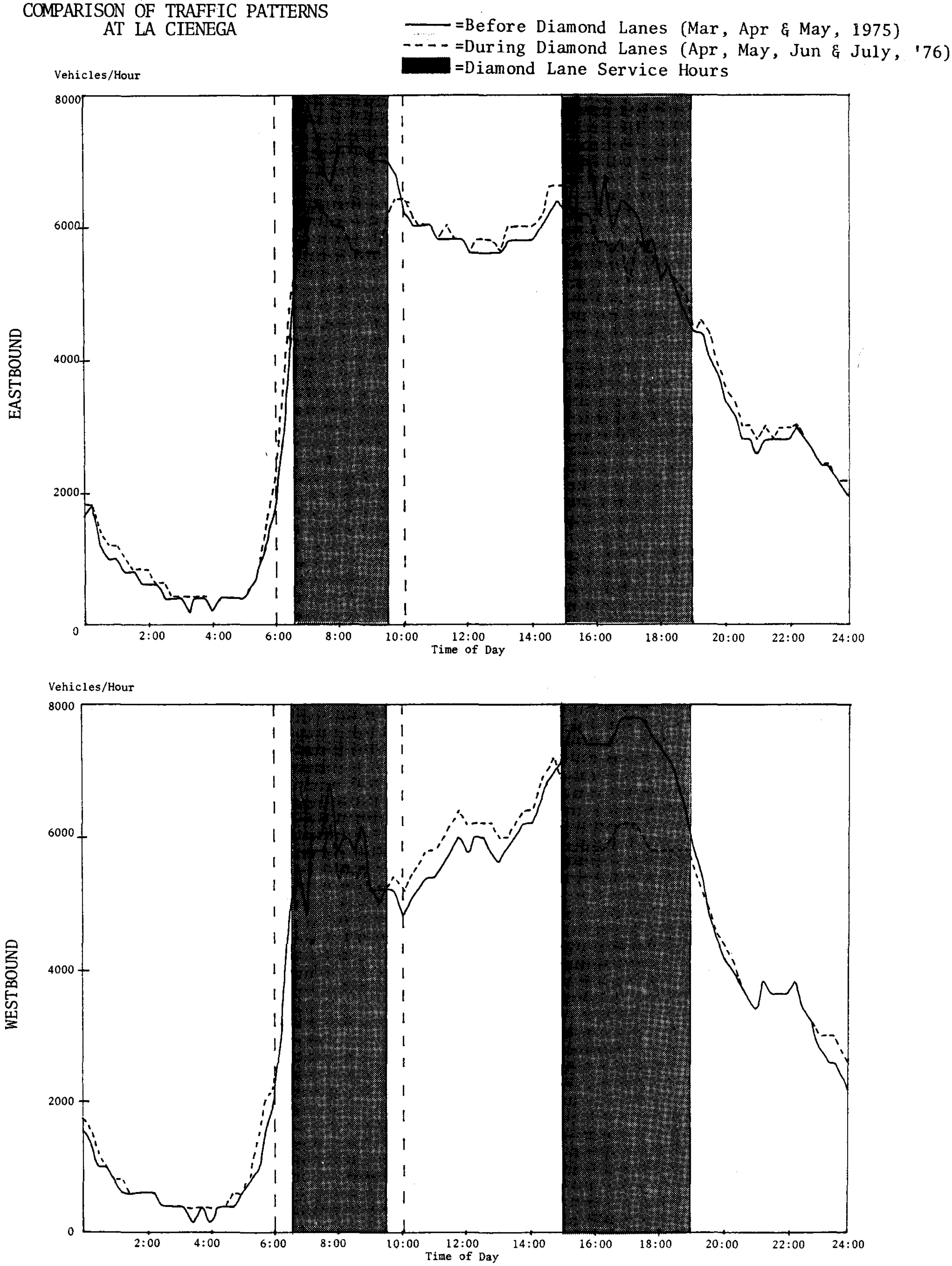
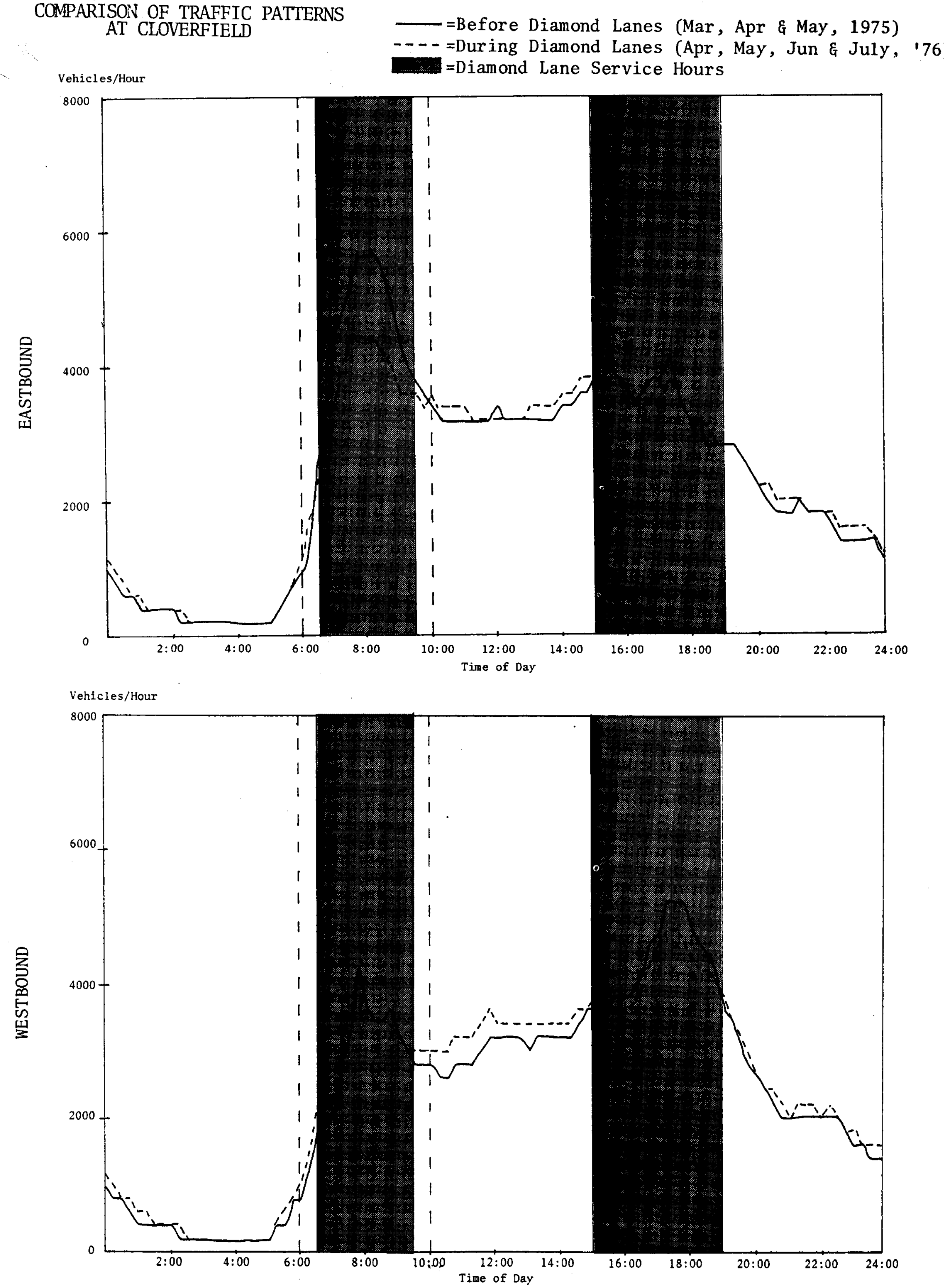


EXHIBIT 5.14

COMPARISON OF TRAFFIC PATTERNS
AT CLOVERFIELD



sors, located 4.4 miles west of the La Cienega sensors, vehicle volumes are considerably lower for all periods, and the reduction in travel volumes with the introduction of the Diamond Lanes is less marked in the off-peak directions of travel.

At all screenlines, vehicle volumes increased during the midday hours when the Diamond Lanes were not operational. Table 5.21 lists average travel volumes recorded between the hours of 10:00 A.M. and 3:00 P.M. at three sensor stations before and during the Diamond Lane demonstration. Average midday traffic volumes increased during the Diamond Lane project for travel in each direction at each of the observed measuring stations. These increases suggest that certain drivers who had some flexibility in their choice of travel times elected to travel during the midday lull rather than face the much-publicized freeway congestion during Diamond lane operating hours. To the extent that drivers were willing and able to reschedule non-work trips for such purposes as shopping and recreation to avoid the peak periods, peak-hour freeway congestion was reduced, and a better-balanced, more efficient use of the freeway itself resulted.

TABLE 5. 21

TOTAL MIDDAY VEHICLE VOLUMES
ON THE SANTA MONICA FREEWAY

(10:00 AM-3:00 PM)

Sensor Station	Eastbound Vehicles	Westbound Vehicles
Crenshaw		
Before ◇ Lanes	34,646	35,451
During ◇ Lanes	34,785	36,543
Increase	139	1,092
La Cienega		
Before ◇ Lanes	29,269	29,279
During ◇ Lanes	29,984	30,756
Increase	715	1,477
Cloverfield		
Before ◇ Lanes	16,403	15,328
During ◇ Lanes	17,063	16,636
Increase	660	1,308

Because the switch to buses and carpools increased the number of travelers per vehicle using the Santa Monica Freeway during the peak hours, a comparison of individual travel patterns by time of day shows less pronounced differences than a comparison of vehicle throughput before and during the Diamond Lane demonstration. Exhibit 5.15 traces freeway ridership patterns at the Crenshaw measuring station in the peak direction of flow during the morning and evening operating hours. This exhibit shows that, on an average day during the project, the number of travelers during the morning and evening peaks at Crenshaw Boulevard was less than the average number observed prior to the project. The use of averages drawn over the life of the demonstration is somewhat misleading, however, since the number of vehicles and people using the freeway increased as the project continued. By the close of the project, the number of people carried on the freeway exceeded pre-projected levels during the time intervals around 7:45 in the morning and 5:00 in the evening.

5.5.5 Volumes by Lane

Although freeway loop sensors measured traffic in each lane along the freeway, not all sensor locations sampled traffic in all lanes and information on traffic flow was not generally recorded on a lane-by-lane basis.* In an attempt to record this and other aspects of the Diamond Lane demonstration, freeway traffic in the peak directions was filmed on the first and fourth days of the demonstration using time-lapse photography at the Western Avenue screenline. Subsequent examination of the film provided a basis for estimating the occupancy of the Diamond Lanes and each of the three non-Diamond Lanes at Western Avenue. A sampling of the film showed that the vehicles in the three non-preferential lanes were distributed so that 35 percent were in the number-two lane, adjacent to the Diamond Lane, 34 percent were in the number-three lane, and 31 percent were in the number-four lane. This situation is depicted graphically in Exhibit 5.16. Prior to the project, an average of approximately 1,800 vehicles per hour passed the Western Avenue screenline in each direction. Following project implementation, vehicle flow in the Diamond Lanes dropped markedly, while the flow of eastbound vehicles in the morning increased to an average of 2,139 vehicles per hour in each non-preferential lane. Traffic flow in the westbound direction during the evening peak dropped to 1,678 vehicles per hour in the non-preferential lanes, a drop of nine percent below pre-project levels. Some portion of this drop may be attributed to the increased congestion accompanying the Diamond Lane project. It is likely, however, that the decline in vehicle throughput in the main westbound lanes at Western Avenue can be traced primarily to the increased use of the adjacent collector roadway by drivers attempting to postpone their entry to the congested freeway until the last possible moment.

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*In the case of the Diamond Lane itself, special programs were developed in advance of the demonstration to isolate, record, and report data from those sensors located in the Number 1 freeway lane.

EXHIBIT 5.15: COMPARISON OF RIDERSHIP PATTERNS AT CRENSHAW BLVD.

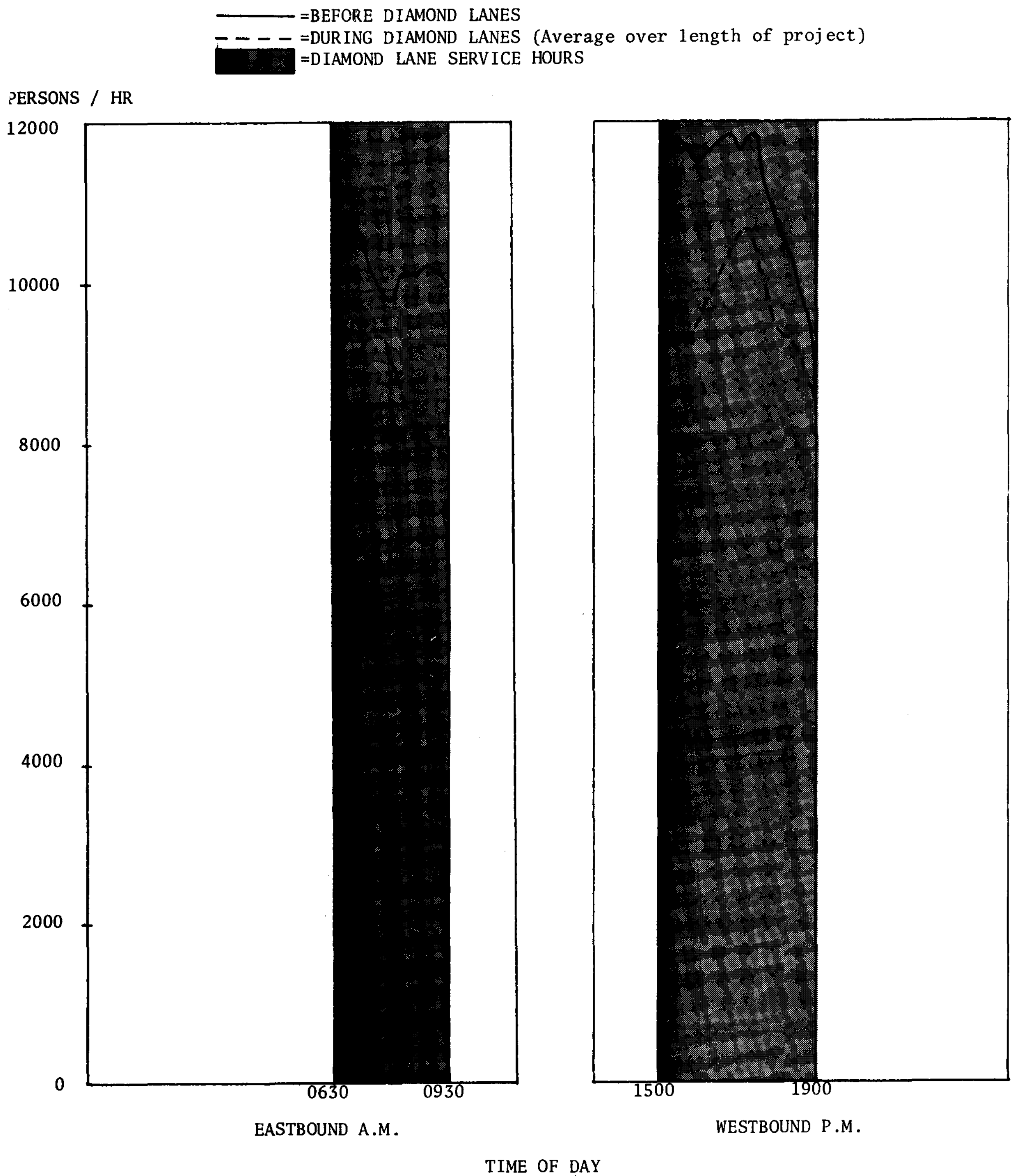


EXHIBIT 5.16: AVERAGE VEHICLES PER LANE PER HOUR BEFORE AND DURING THE DIAMOND LANE PROJECT

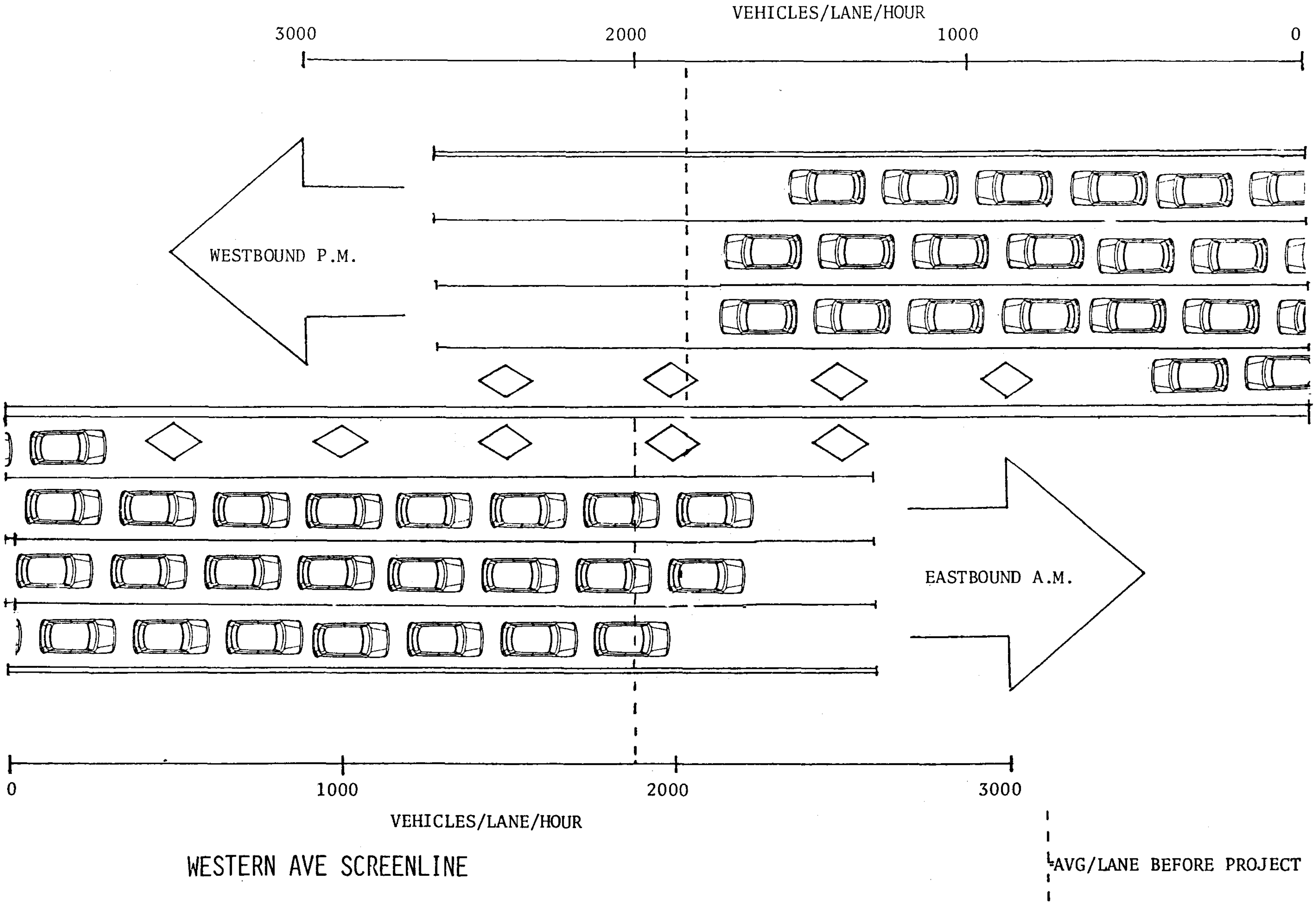


Exhibit 5.17 translates the vehicle volume figures depicted in Exhibit 5.16 into passenger throughput. This illustration shows that freeway ridership at the Western Avenue screenline was greater during the project than before the project in the eastbound direction, while it decreased in the westbound direction during the project.

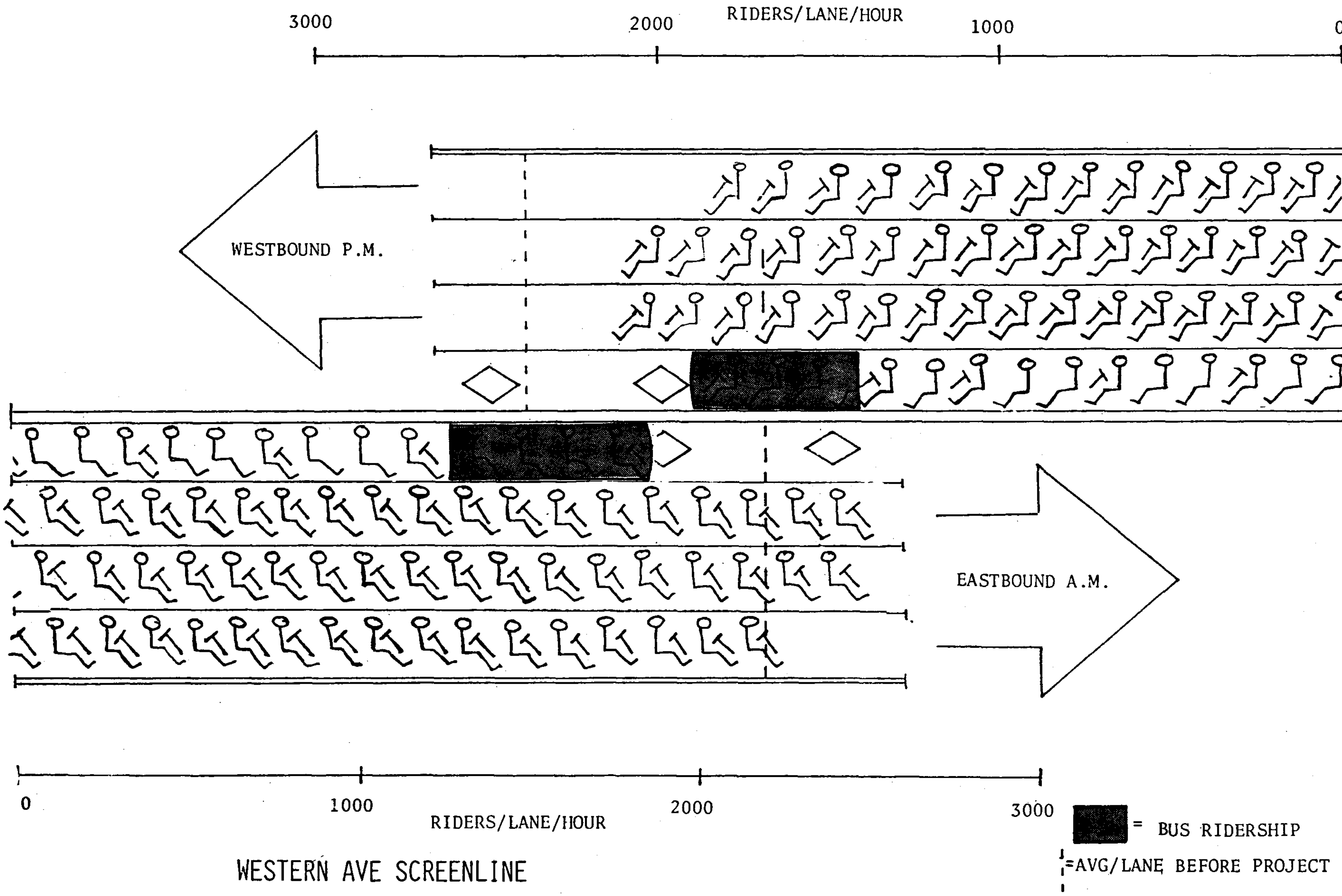
While volume counts yielded approximately equal figures for Lanes 2 and 3 on the Santa Monica Freeway during the Diamond Lane demonstration, time-lapse films (one frame per second) showed a more sporadic traffic flow in Lane 2; traffic slowed and stopped more frequently in this lane. For a rough comparison of the continuity of flow in the lanes, the film was used to estimate how many car-minutes were spent at a halt. Counts of stopped cars in each camera frame were made by lane for peak hours in the direction of heavy traffic flow (eastbound, 7:00 to 8:00 A.M. and westbound, 4:00 to 5:00 P.M.).

CAR-MINUTES OF STOPPAGE WITHIN CAMERA OBSERVATION

Lane	Eastbound AM (7:00-8:00 AM)	Westbound PM (4:00-5:00 PM)
1	---	---
2	2.32 min.	42.93 min.
3	---	7.80 min.
4	---	---

Table 5.27 summarizes the average traffic flow in the non-preferential lanes at each of four sensor stations before and during the Diamond Lane demonstration. At Crenshaw Boulevard, average vehicle throughput in the non-preferential lanes dropped during the project, while average throughput per lane at La Cienega Boulevard rose in the eastbound lanes and dropped slightly in the westbound lanes, and average throughput per lane at Cloverfield Boulevard rose during the demonstration in both eastbound and westbound non-preferential lanes. To some extent, this

EXHIBIT 5.17: AVERAGE RIDERSHIP PER LANE PER HOUR BEFORE AND DURING THE DIAMOND LANE PROJECT



WESTERN AVE SCREENLINE

TABLE 5.22

VEHICLES PER HOUR PER LANE AT SELECTED LOCATIONS

COUNTING STATION	BEFORE ◇ LANES	DURING ◇ LANES: NON-◇ LANES	DURING ◇ LANES: ◇ LANES
Western Avenue (4 lanes each direction)			
Eastbound/6:30-9:30 a.m.	1,870	2,139	284*
Westbound/3:00-7:00 p.m.	1,842	1,678	492
Crenshaw Boulevard (5 lanes each direction)			
Eastbound/6:30-9:30 a.m.	1,717	1,561	319
Westbound/3:00-7:00 p.m.	1,767	1,653	487
La Cienega Boulevard (4 lanes each direction)			
Eastbound/6:30-9:30 a.m.	1,726	1,831	265
Westbound/3:00-7:00 p.m.	1,856	1,848	416
Cloverfield Boulevard (4 lanes each direction)			
Eastbound/6:30-9:30 a.m.	1,167	1,236	92
Westbound/3:00-7:00 p.m.	1,093	1,320	141

* Automatic count not available; indicated figure is manual count.

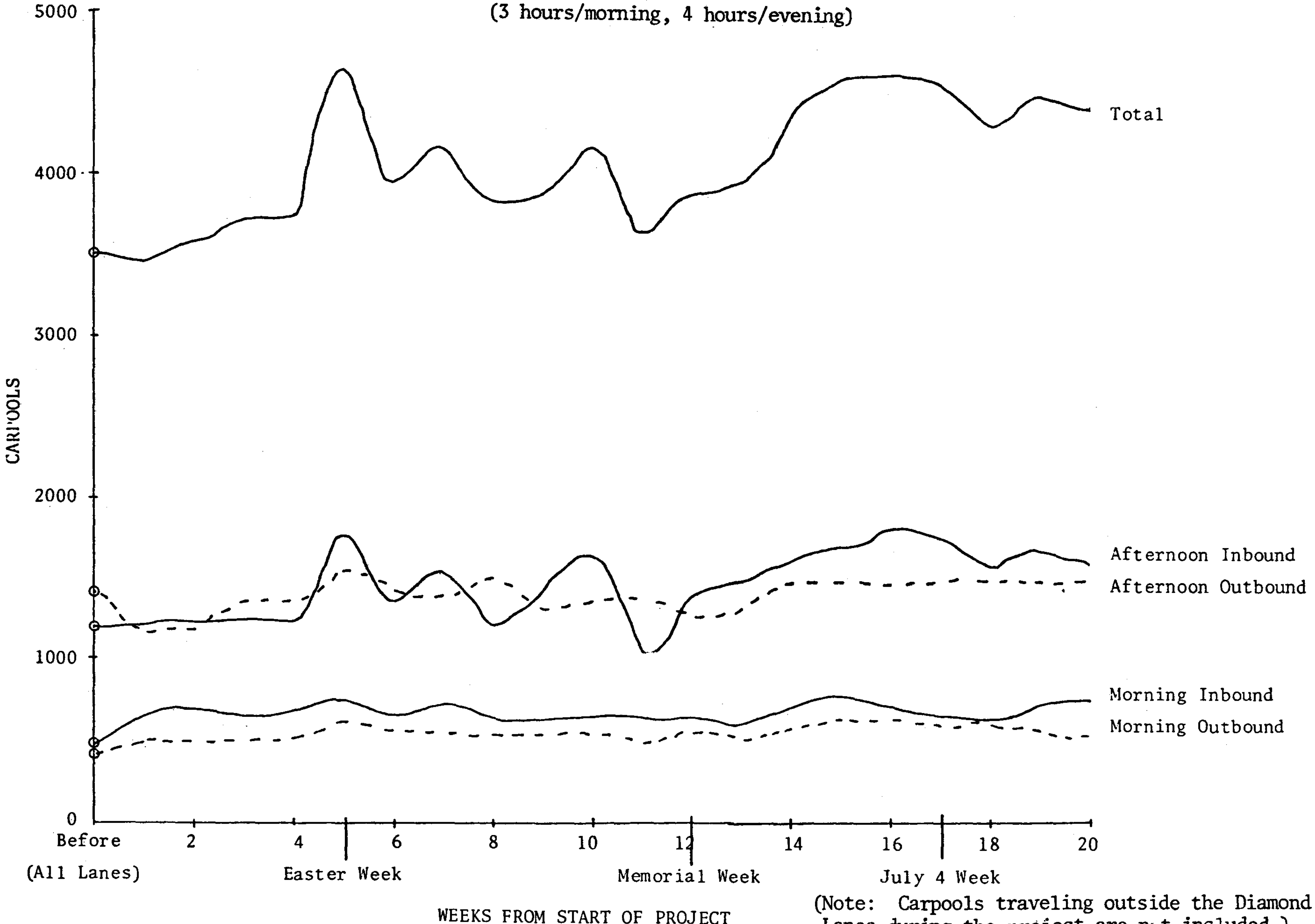
TABLE 5.23

SUMMARY OF CARPOOL STATISTICS BY SEVEN-WEEK PERIOD

	Before Project	Weeks 1-7	Weeks 8-14	Weeks 15-21
PEAK DIRECTIONS				
Eastbound/6:30-9:30 a.m.				
◇ Lane Carpools	--	664	626	706
Non-◇ Lane Carpools	474	56	106	117
Total Carpools	474	720	732	823
Percent Increase Over Before	--	52%	54%	74%
Westbound/3:00-7:00 p.m.				
◇ Lane Carpools	--	1,332	1,375	1,482
Non-◇ Lane Carpools	1,405	189	389	518
Total Carpools	1,405	1,521	1,764	2,000
Percent Increase Over Before	--	8%	26%	42%
Peak Direction Subtotal	1,879	2,241	2,496	2,823
Percent Increase Over Before	--	19%	33%	50%
OFF-PEAK DIRECTIONS				
Westbound/6:30-9:30 a.m.				
◇ Lane Carpools	--	516	537	617
Non-◇ Lane Carpools	403	57	99	129
Total Carpools	403	573	636	746
Percent Increase Over Before	--	42%	58%	85%
Eastbound/3:00-7:00 p.m.				
◇ Lane Carpools	--	1,367	1,417	1,692
Non-◇ Lane Carpools	1,197	164	374	488
Total Carpools	1,197	1,531	1,791	2,180
Percent Increase Over Before	--	28%	50%	82%
Off-Peak Direction Subtotal	1,600	2,104	2,427	2,926
Percent Increase Over Before	--	32%	52%	83%
TOTALS (6:30-9:30 a.m. & 3:00-7:00 p.m.)				
◇ Lane Carpools	--	3,879	3,855	4,497
Non-◇ Lane Carpools	3,479	466	968	1,252
Total Carpools	3,479	4,345	4,923	5,749
Percent Increase Over Before	--	25%	42%	65%

EXHIBIT 5.18: DAILY DIAMOND LANE CARPOOL VOLUMES COUNTED AT WESTERN AVENUE

(3 hours/morning, 4 hours/evening)



(Note: Carpools traveling outside the Diamond Lanes during the project are not included.)

varied behavior can be attributed to the instability of traffic flow near the peak of the standard traffic engineering curves relating volume and speed measurements. Under the relatively free-flow conditions existing at Cloverfield Boulevard, the constriction of traffic flow resulted in lower speeds and an increased number of vehicles per lane per hour. Under the forced-flow conditions existing at sensors closer to the Los Angeles CBD, however, the closing of one lane to general traffic often resulted in a decline in both speeds and per-lane traffic volumes.

5.6 CARPOOL FORMATION

One of the primary local objectives of the Diamond Lane demonstration was "to explore and evaluate concepts aimed at increasing vehicle occupancy ... by creating incentives to encourage public transit ridership and carpooling" (see Section 2.1). As indicated in Tables 5.19 and 5.20, the number of carpools carrying three or more people on the Santa Monica Freeway increased markedly with the Diamond Lane demonstration. Carpool statistics from these tables are tabulated in Table 5.23 for ease of reference. These statistics show that the total number of carpools using the Santa Monica Freeway increased about 65% from before the start of the demonstration to its last seven weeks. Relative to other traffic, carpools constituted less than 3.1% of all vehicles and 8.5% of all people using the freeway prior to the project. By the last seven weeks of the project, carpools accounted for 5.7% of all vehicles and 14.3% of all people using the freeway at Crenshaw Boulevard.

5.6.1 Evolution Over Time

The week-by-week buildup of Diamond Lane carpools in each direction of travel is plotted in Exhibit 5.18. Statistics supporting this exhibit, which were compiled from visual observations made at the Western Avenue screenline which did not include three-person carpools outside the Diamond Lanes, may be found in Appendix C. Except for a few variations during the afternoon, carpool ridership generally increased throughout the length of the project. Gains in carpool ridership were made early in the demonstration, and continued throughout the project. Thirty-eight percent of the total increase in carpool usage recorded by the close of the demonstration was attained during the first seven weeks, or the first third of the project.

The trends depicted in Table 5.23 and Exhibit 5.18 provide a variety of insights into the patterns of carpool formation and suggest several potential explanations for these patterns. Afternoon traffic in the eastbound Diamond Lane increased markedly during Easter week, which contained parochial school holidays, and rose steadily following Memorial Day. The timing and direction of these increases suggests that much of the increased Diamond Lane usage during these periods may be attributed to groups of vacationing beachgoers returning from the ocean. Although no formal data were assembled to support this observation, Diamond Lane observers noted a number of surfboard sightings during the periods in question.

Exhibit 5.18 and Table 5.23 reveal that the largest increases in carpooling occurred during the morning peak. Table 5.23 shows further that the net increase in carpools was greater in the off-peak directions of travel, perhaps because the Diamond Lane buses offered competitive service in the peak directions of travel for work trips destined for the CBD.

5.6.2 Non-Diamond Lane Carpoolers

Table 5.23 shows that a number of freeway vehicles carrying three or more passengers per car were not in the Diamond Lanes when the cars passed the observation point. The percentage of qualified vehicles outside the lanes increased over the length of the project, rising to 22 percent of total freeway carpools by the last seven weeks of the demonstration. There are several possible explanations for this lack of usage of the lane by qualified vehicles. At any point along the freeway, several carpools could be expected to be in other lanes attempting to work their way into or out of the Diamond Lanes. Other three-person carpools may have been in the midst of shorter trips, so that the lane changing required to reach the Diamond Lane was not justified. There are indications, however, that some qualified carpools may have avoided using the Diamond Lanes for a variety of other reasons, ranging from access and egress difficulties to a feeling of discomfort generated by the speed differential between the Diamond Lanes and adjacent lanes.*

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*One CALTRANS driver making speed runs in the Diamond Lanes appended the following note to his tachograph recording: "A strange feeling comes over (you) when you drive the Diamond Lane and see on the right all those cars parked. 'What if someone decides to pull into the Diamond Lane? Crash!'" On this same speed run, the driver was unable to weave through the congested traffic in time to leave the freeway at the designated off-ramp.

In an attempt to explore the reactions of carpoolers to the use of the Diamond Lanes, the Corridor Driver Survey asked respondents to specify the types of difficulties they had encountered using the Diamond Lanes. Responses to this question are tabulated in Table 5.24 for three categories of drivers: single-occupant auto drivers; drivers of two-person carpools; and drivers of carpools with three or more occupants. Drivers were classified by their ordinary mode of travel in the corridor. As noted in the table, many drivers who normally drove alone or with one other person reported using the Diamond Lanes occasionally, presumably when they had enough passengers to qualify for entry into the reserved lane.

Table 5.24 shows that, of the 803 drivers reporting that they had used the lane, 679 or 85 percent reported experiencing one or more of the difficulties identified in the questionnaire. It is impossible to identify the severity of these difficulties from the survey response. The nature of the question, in which several potential difficulties were identified, may have prompted responses from users who viewed the problems as minor and infrequent, but who had experienced them at one time or another. Of those freeway users who presumably used the Diamond Lanes most often, drivers of three-person carpools, 82.6% reported having one or more difficulties using the lane. The problems most frequently cited by these drivers were difficulties leaving the Diamond Lane, and an uncomfortable feeling generated by the speed differential between the Diamond Lanes and adjacent lanes. A lower percentage of those non-carpoolers who usually traveled with one or two persons per car, and presumably used the Diamond Lanes only occasionally, reported feeling uncomfortable driving faster than other cars on the freeway. The problems most frequently cited by these occasional users were difficulties leaving and entering the lane.

5.6.3 Diamond Lane Carpool Characteristics

The characteristics of carpools with three or more persons can be inferred from the corridor user survey. A sample of 92 responses was received from three-or-more person carpools using the freeway. The information obtained specifically from carpoolers includes the carpool size (people), date the carpool began, method of formation, primary incentive to carpool, previous travel mode, number of cars used by the carpool, number of cars left at home, miles driven by cars left home, and opinion about carpooling. These results are summarized below.

The average carpool size for this sample was 3.46,* ranging from three-person carpools (58.7%) to one six-person carpool. The starting dates varied considerably. April 1952 was the earliest and November 1976 was the latest; 25% of the carpools

*The average carpool size recorded in all Diamond Lane observations made during the project was 3.37 passengers per carpool.

TABLE 5.24: DIAMOND LANE DIFFICULTIES

	ORDINARY TRAVEL MODE		
	Single Occupant Drivers	2-Person Carpools	3 or more Person Carpools
Total Number of Carpools	2371 (100%)	287 (100%)	92 (100%)
●Never used the ◆ lanes	1469 (62%)	117 (41%)	5 (5%)
●Used the ◆ lanes	583 (25%)	134 (47%)	86 (93%)
●No response	319 (13%)	36 (12%)	1 (2%)
Difficulties Experienced			
Total number that used ◆ lanes	583 (100%)	134 (100%)	86 (100%)
●Experienced one or more difficulties	497 (85%)	111 (83%)	71 (83%)
●Experienced no difficulties	86 (15%)	23 (17%)	15 (17%)
Nature of Difficulties (multiple responses included)			
Total Difficulties Identified	811 (100%)	169 (100%)	113 (100%)
●Entering ◆ lane	247 (31%)	42 (25%)	20 (18%)
●Leaving ◆ lane	292 (36%)	57 (34%)	30 (26%)
●Following buses	101 (12%)	23 (14%)	21 (19%)
●Faster than next lane	121 (15%)	34 (20%)	30 (26%)
●Other	50 (6%)	13 (12%)	12 (11%)

* Driver classification is by ordinary mode of travel in the corridor. Many drivers of single occupant vehicles and two person carpools reported using the diamond lane occasionally, presumably when they had enough passengers to meet the 3-person minimum requirement.

responding were formed during the Diamond Lane project period. Of those carpools that were formed during the project, 30% identified the Diamond Lanes as the primary incentive behind the decision to carpool, while 35% reported cost incentives as the most important impetus to carpool, and 10% noted a desire to save energy and reduce pollution. Only 5% reported arranging carpools because of the preferential on-ramps.

Starting Date	Percent of Carpools
Before 1970	14
1970-1973	10
1973	8
1974	13
1975	18
1976	37
Before ◇ Lanes	7
During ◇ Lanes	25
After ◇ Lanes	5

The importance of incentives differs from the above figures when one considers all carpoolers (i.e., those carpools formed before, during and after the project). Of this larger group, 63% mentioned the primary incentive as cost savings, while 18% wanted to reduce energy consumption, and 8% merely wanted to avoid driving. Only 2.2% mentioned on-ramp bypass lanes as a factor in their decision.

Most three-person Santa Monica Freeway carpools (54%) were formed among co-workers; 20% were formed by friends and neighbors, and 17% by family members. Of the carpools responding to the survey, 3.3% reported that Commuter Computer provided the information used in matching carpool members. Regarding previous travel modes, 67% of the carpool members reported that they previously drove alone; 15% said they didn't make the trip before, and 14% belonged to another carpool. An additional 2% previously traveled by bus.

To estimate the vehicle mileage reduction attributable to Diamond Lane carpool formation, carpoolers were asked how many cars were used by the carpool at the start of the trip. For example, rather than having a single driver stop at each person's home in the morning, some carpools meet at a common point and transfer to one car. Carpoolers were also asked how many cars were left at home because of the carpool, and how many miles these cars were driven during the day. These questions were designed to provide a basis for estimating the actual reduction of vehicle mileage that was due to carpooling. The average number of cars used by the three-person carpools each morning was 1.63, with 53.3% of the carpools using a single car. The average number of cars left at home was 1.22 per reporting carpool. Respondents reported that 22% of the cars left at home had been driven an average of 16 miles per day.

Finally, the carpoolers were asked to express their general attitude toward carpooling; 29% were quite satisfied with it as a long-term means of commuting and 8% were dissatisfied. Many (45%) responded that they were generally satisfied, but felt that a good mass transit system would provide a better means of future commuting. The remaining 18% were generally satisfied, but felt that more should be done to provide preferential lanes for carpools.

5.7 SURFACE STREET VOLUMES AND OCCUPANCIES

5.7.1 Western Avenue Screenline Volumes

Traffic volumes were recorded along the surface streets at several locations. Measurements are most complete at the Western Avenue screenline, where CALTRANS recorded volumes on seven surface streets parallel to the Santa Monica Freeway (Olympic, Pico, Venice, Washington, Adams, Jefferson and Rodeo). Measurements at this screenline were taken before initiation of the Diamond Lanes, during each of three seven-week periods throughout the project, and following the close of the project in the eastbound direction from 6:30 to 9:30 A.M. and in the westbound direction from 3:00 to 7:00 P.M.

The results of the CALTRANS volume counts are shown in Table 5.25. These counts show that surface street volumes at Western Avenue rose markedly during the initial weeks following the initiation of the Diamond Lane demonstration, and then dropped as the demonstration progressed. It is not known whether this late demonstration drop is due to a return of diverted automobiles to the freeway or to a natural decline in traffic with the summer months. The LADT reports that no studies have been made of seasonal traffic variations on the surface streets of Los Angeles. The subsequent increase in volumes during October, when post-project measurements were made, suggests that some portion of the observed decrease during the later weeks of the project may be traced to summer traffic reductions.

Eastbound A.M. Peak Period

On five of the seven streets (Olympic, Pico, Washington, Adams and Rodeo), morning peak period volumes decreased in the eastbound direction from the period before the project to the last seven-week period of the project. Volumes actually rose

TABLE 5.25

RUSH-HOUR TRAFFIC VOLUMES ON CITY STREETS AT WESTERN AVENUE

(Both Manual and Automatic Counts, as Available)

	Olympic	Pico	Venice	Washington	Adams	Jefferson	Rodeo	TOTAL	Percent Change
EASTBOUND MORNING (6:30-9:30 AM)									
Pre-Demonstration	5,060	1,885	2,730	2,370	1,894	1,087	3,789	18,815	---
Weeks 1-7	5,688	2,004	3,112	2,473	2,113	1,034	3,985	20,409	+8.5
Weeks 8-14	5,027	1,612	3,069	2,321	1,708	1,161	3,055	17,953	-4.6
Weeks 15-21	4,458	1,528*	2,761	1,876	1,560	1,162	3,433	16,778	-10.8
Post-Demonstration	3,110	1,893	2,950	1,613	1,861	1,347	4,425	17,199	- 8.6
WESTBOUND EVENING (3:00-7:00 PM)									
Pre-Demonstration	6,152	2,769	3,469	3,716	3,042	1,672	4,432	25,252	---
Weeks 1-7	7,077	3,531	4,270	3,988	3,577	1,383	4,979	28,805	+14.1
Weeks 8-14	6,457	2,668	3,119	3,682	2,999	2,183	4,576	25,684	+1.7
Weeks 15-21	6,487	2,135	3,866	3,614	2,887	2,237	4,244	25,470	+0.9
Post-Demonstration	6,127	2,600	3,050	2,720	4,157	3,025	4,665	26,434	+4.7

	GRAND TOTAL	% CHANGE
Pre-Demonstration	44,067	---
Weeks 1-7	49,214	+11.7
Weeks 8-14	43,637	- 1.0
Weeks 15-21	42,248	- 4.1
Post-Demonstration	43,633	- 1.0

*Manual count only--automatic counter malfunctioned.

during the first weeks of the project, then dropped to below "before" volumes in subsequent weeks. On Venice and Jefferson, volumes rose: Venice experienced a sharp rise during the first seven weeks of the project, followed by a tapering-off in counts, while volumes on Jefferson decreased during the beginning weeks of the project and then rose to surpass "before" volumes.

Westbound P.M. Peak Period

Four of the seven streets (Pico, Washington, Adams and Rodeo) experienced volume reductions in the westbound direction during the evening peak period. Volumes rose during the first seven-week period of the project, then dropped below "before" volumes. On Olympic and Venice, volumes increased during the beginning weeks, then dropped, but still surpassed before counts by the third seven-week period (though at Venice, second seven-week volumes were lower than before volumes). Volumes dropped during the first seven weeks on Jefferson, then rose to exceed "before" volumes.

5.7.2 Other Volume Counts

In addition to data assembled by CALTRANS, the LADT also measured city street volumes during the Diamond Lane demonstration. The LADT sampled volumes at a variety of points along the Santa Monica, Olympic, Pico, Washington, and Adams Boulevards in April and July 1976. These statistics were compared with data taken throughout 1975 in connection with another LADT project to provide "before-during" comparisons of surface street volumes in the Santa Monica corridor. Because the counts made during the Diamond Lane project were not necessarily made at precisely the same locations as the 1975 counts, the LADT averaged volumes along segments of the eastwest boulevards in summarizing "before-during" comparisons. Shortly after project implementation in April 1976, the LADT "before-during" comparisons showed average volume increases on all surface streets sampled ranging from 11.5% for westbound morning traffic to 17% for eastbound evening traffic. Contrary to CALTRANS data, which showed surface street volumes at Western Avenue decreasing with time, the LADT summary measurements suggest that volumes on surface streets remained high through the summer. LADT measurements made in July 1976 show increases of between 13.5 and 17.6 percent on all surface streets when compared with the average measurements made at various times and locations during the pre-project year 1976.*

As a result of the adversary position adopted by the LADT toward the Diamond Lane project in the PLF trial, SYSTAN was denied access to LADT surface street data until late in the evaluation process, and time did not permit the detailed com-

*Summary surface street volumes reported in tables transmitted to SYSTAN by LADT on March 23, 1977.

parison of LADT and CALTRANS statistics. Spot checks made at the Western Avenue screenline suggest that the primary differences between the two sets of data are in the levels recorded before the project. Those recorded by the LADT are somewhat lower and, consequently, reflect relatively higher increases for similar sets of volumes recorded during the project.

In an attempt to explore the question of city street volumes further, the investigating team examined the basic vehicle volume counts assembled by the LADT and extracted a sampling of counts along the east-west routes, where measurements were made at comparable locations before and during the Diamond Lane project and where measurements were made in both April and July of 1976. These locations are displayed in Exhibit 5.19, along with the locations of the Western Avenue screenline counts made by CALTRANS.

A lack of consistent data on all east-west boulevards thwarted attempts to develop full-fledged screenlines west of the Western Avenue screenline. The locations mapped in Exhibit 5.19 represent preliminary attempts to develop such screenlines using existing data. Table 5.26 displays volume counts recorded before and during the project at these locations. On the whole, these locations reflect a general increase in surface street travel with the advent of the Diamond Lanes.

Orange-La-Brea "Screenline"

Counts of eastbound traffic at Orange Avenue on Olympic show that in the morning peak period, volume dropped dramatically during the first seven weeks, then rose to surpass "before" counts. On Adams (at La Brea) volume increased, then substantially decreased to a lower count in the last seven weeks than volume before the project's commencement. In the westbound P.M. direction, volumes on both streets rose in the first seven weeks. Volumes at Olympic subsequently dropped to a figure still higher than "before" volume, while on Adams volume returned to pre-project levels.

Spaulding-Fairfax "Screenline"

Figures from the Spaulding-Fairfax screenline show an overall increase in eastbound volumes during the morning peak period on both Olympic and Adams. Volumes on Olympic decreased somewhat and then rose to a level higher than that of the pre-project period. Adams experienced a marked increase in the first weeks, followed by a smaller decrease. In the westbound direction, afternoon volume on Olympic continually increased, while on Adams the volume continually decreased.

TABLE 5.26: TRAFFIC VOLUMES AT SELECTED LOCATIONS

INTERSECTION LOCATION	Eastbound (6:30-9:30 AM)				Westbound (3:00-7:00 PM)			
	◆ Before Lanes	During ◆ Lanes			◆ Before Lanes	During ◆ Lanes		
		1st 7 Wks.	2nd 7 Wks.	3rd 7 Wks. (July '76 Sample)		1st 7 Wks. (April '76 Sample)	2nd 7 Wks.	3rd 7 Wks. (July '76 Sample)
Olympic & Veteran	4,745	5,230	ND	5,058	7,408	8,018	ND	7,930
Pico & Sepulveda	2,836	2,811		3,101	4,881	5,258		4,974
Olympic & Spaulding	3,605	3,525		4,147	5,405	6,162		6,301
Adams & Fairfax	547	1,053		887	1,638	1,586		1,358
Olympic & Orange	4,037	3,048		4,308	6,121	7,022		6,185
Adams & La Brea	1,862	1,978		1,432	2,919	3,364		2,910
Total	17,632	17,645		18,933	28,372	31,410		29,658
Increase Over Before	--	0.1%		7.3%	--	10.7%		4.5%

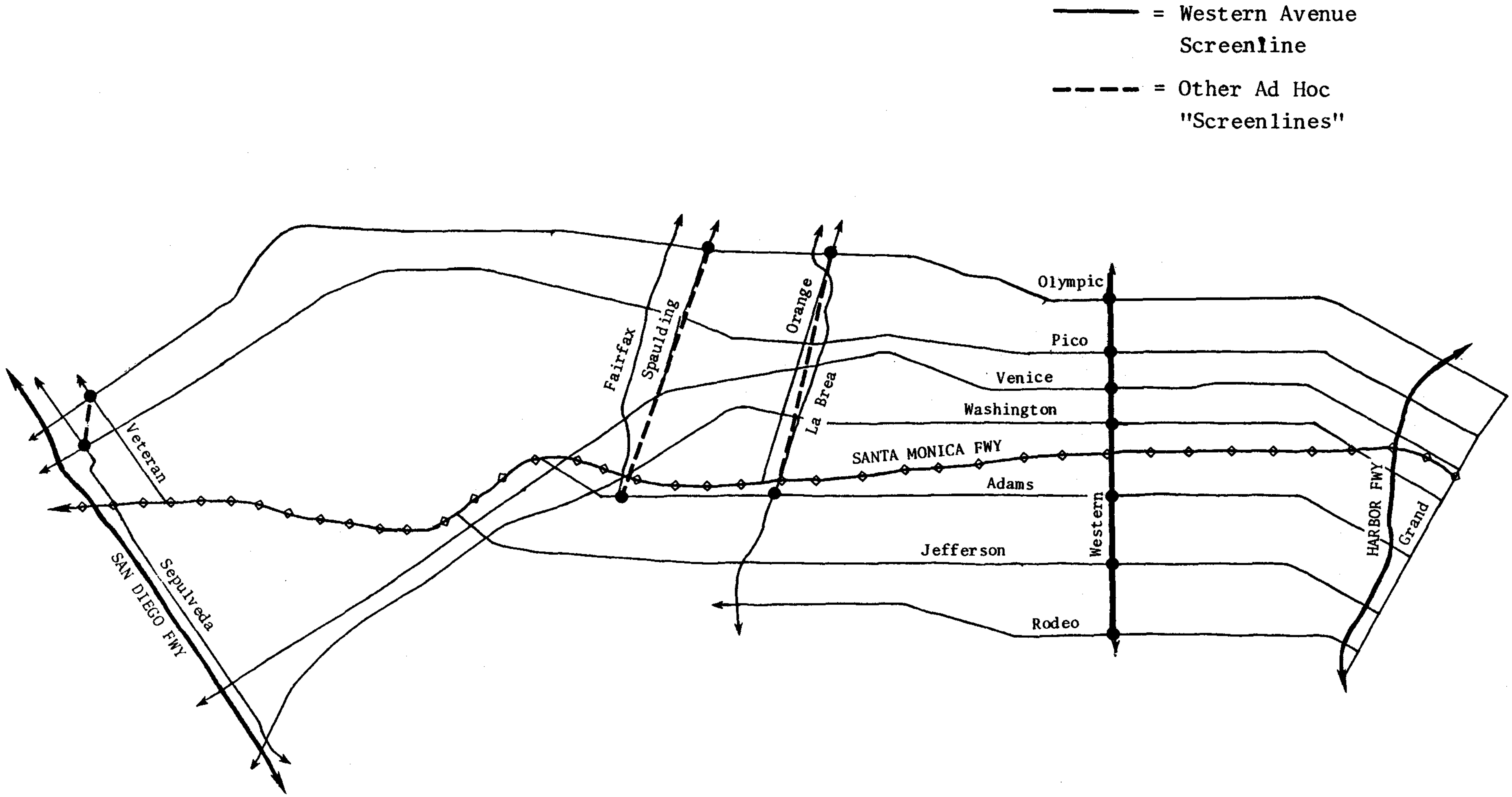
	Before	During	
		April,'76	July '76
Grand Total, Both Peak Directions	46,004	49,055	48,951
Percent Increase		6.6%	5.6%

ND: No Data Record

(Source: Los Angeles City Department of Traffic)

EXHIBIT 5.19

LOCATION OF VOLUME COUNTS ON SURFACE STREETS



Veteran-Sepulveda "Screenline"

During the morning peak period, an overall increase in eastbound traffic was observed on Olympic at Veteran and on Pico at Sepulveda. Traffic through this screenline on Olympic peaked the first seven weeks and then decreased. On Pico, volumes dropped during the first period, later increasing to surpass pre-project figures. In the westbound direction during the peak afternoon period, volumes on both streets increased during the first seven-week period, and then fell, still remaining above pre-project levels.

5.7.3 Surface Street Occupancy Counts

Corridor occupancy counts made on seven east-west surface streets* prior to the project in October 1975 and again during the project in May 1976 and July 1976, are summarized below:

	Eastbound: 6:30-9:30 AM Passengers/Car		Westbound: 3:00-7:00 PM Passengers/Car	
	Mean	Std. Dev.	Mean	Std.Dev.
Before project (October 1975)	1.23	.06	1.37	.09
Mid-project (May 1976)	1.22	.05	1.34	.08
Late-project (July 1976)	1.24	.05	1.38	.10

The general pattern characterizing both eastbound and westbound occupancy levels is an initial drop, followed by an increase to levels slightly higher than pre-project levels by July 1976. The initial decline could be explained by the diversion of non-carpoolers to the city streets, while the later increase could be explained either by their subsequent return to the freeway or by an increase in family travel during the summer months. In all probability, both of these factors help to explain the subsequent increase. Statistical tests (t-tests made at an .05 level of significance) attribute no statistical significance to either the mid-project or late-project changes in occupancy rates.

*The seven streets were Venice, Olympic, Pico, Washington, Adams, Jefferson, and Rodeo/Exposition. All counts were made at the Western Avenue screenline, except for one set of observations on Washington Boulevard. In October 1976, measurements of eastbound traffic in the morning along Washington Boulevard were made at La Cienega, not Western.

5.7.4 Summary

Given the inherent uncertainty in traffic volume and occupancy counts, it is difficult to draw conclusions regarding the detailed disposition of surface street traffic during the Diamond Lane project. In the aggregate, it seems clear that east-west traffic volumes on corridor surface streets increased with the initiation of the demonstration, rising on the order of 10% to 15% within the first seven weeks following March 15. What happened as the demonstration progressed is less clear. Certain sets of volume counts indicate a return to normal traffic levels, a conclusion supported by the upward shift in surface street occupancy levels and by the steady increase in freeway travel throughout the project, which could be explained by the return of non-carpoolers originally diverted to the city streets. Other volume counts argue that surface street levels continued to remain at increased levels throughout the demonstration. Attempts to resolve this conflict by comparing data collected in June and July with volumes recorded before the project will always be clouded by the unknown effect of the summer months on surface street traffic in the Santa Monica corridor.

5.8 TRAFFIC DIVERSION

5.8.1 Survey Results

Participants in the corridor driver survey were asked to answer several questions regarding any changes that they made in travel patterns and automobile occupancy during the Diamond Lane demonstration. Tables 5.27 and 5.28 summarize the route and occupancy changes identified in 1,743 usable responses to that series of questions. Changes during and after the Diamond Lane demonstration are shown for a sample population of (1) drivers who used the freeway prior to the demonstration (Table 5.27), and (2) drivers who used parallel city streets prior to the demonstration (Table 5.28). Except for the sample of Diamond Lane carpoolers, which was obtained during the demonstration itself, all corridor drivers sampled in the survey were identified and polled following the close of the demonstration using license-plate records photographed at the Western Avenue screenline. Further details of the survey may be found in Appendix A.

The nature of the survey sampling procedure guarantees that certain types of route and mode shifts will be underrepresented in the replies of respondents. For instance, the percentage of automobile drivers switching to other freeways outside the corridor or to buses is likely to be underrepresented, since no attempt was made to include a sample of other freeway users or bus riders in the surveyed population. Bus riders were surveyed in separate on-board surveys conducted during the demonstration itself (see Section 6.3).

TABLE 5.27

REPORTED CHANGES IN ROUTE AND OCCUPANCY IN THE SANTA MONICA FREEWAY CORRIDOR
DURING AND AFTER THE DIAMOND LANE PROJECT
(Freeway Drivers)

Santa Monica Fwy Users Prior to Diamond Lane	During ◇ Lanes #	During ◇ Lanes % of Response Category	After Diamond Lanes: Currently using same route as prior to project #	After Diamond Lanes: Currently using same route as prior to project % of 'During' Figure	After Diamond Lanes: Currently same occupancy rate as prior to project #	After Diamond Lanes: Currently same occupancy rate as prior to project % of 'During' Figure
1-2 Person Carpools (1349 Responses)						
Remained on Fwy-Remained 1-2/Car AM & PM	838	62.1	802	95.7	820	97.9
Switched to 3+ Car AM & PM	19	1.4	16	84.2	11	57.9
Switched to Bus AM & PM	50	3.7	46	92.0	35	70.0
Switched to City Streets - AM & PM	210	15.6	174	82.9	204	97.1
AM only	66	4.9	55	83.3	65	98.5
PM only	49	3.6	44	89.8	48	98.0
Unspecified	52	3.8	41	78.8	52	100
Total	377	27.9	314	83.3	369	97.9
Switched to Diff. Fwy - AM & PM	40	2.9	38	95.0	40	100
AM only	10	.7	9	90.0	10	100
PM only	10	.7	10	100	10	100
Unspecified	5	.4	5	100	5	100
Total	65	4.7	62	45.4	65	100
3+ Person Carpool (73 Responses)						
Remained on Fwy - Remained 3+ Car AM & PM	71	97.2	71	100	68	95.8
Switched to Bus AM & PM	1	1.4	1	100	1	100
Switched to City Streets - AM & PM	1	1.4	1	100	1	100

TABLE 5.28

REPORTED CHANGES IN ROUTE AND OCCUPANCY IN THE SANTA MONICA FREEWAY CORRIDOR DURING AND AFTER THE DIAMOND LANE PROJECT

(Surface Street Users)

Surface Street Users Prior to Diamond Lane	During Diamond Lanes		After Diamond Lanes: Currently using same route as prior to project		After Diamond Lanes: Currently same occupancy rate as prior to project	
	#	% of Response Category	#	% of "During" Figure	#	% of "During" Figure
1-2 Person Carpools (314 Responses)						
Switched to Freeway - Remained 1-2/Car	45	14.3	2	4.4	42	93.3
Switched to Bus	1	0.3	0	0	1	100
Remained on Surface Streets	268	85.4	169	63.1	260	97.0
3+ Person Carpool (7 Responses)						
Remained on Surface Streets	7	100	5	71.4	7	100

5.8.1.1 Route Changes Reported by Freeway Drivers - Responses show that 69.0% of those respondents using the freeway prior to the project remained on the freeway during the project; 67.2% of the respondents traveling alone or with one other person (62.1%) remained on the freeway. Most of these single- and double-occupant respondents reported no change in route during the project. Only 1.4% of these cars took on extra passengers to make a carpool of three or more, and a slightly larger percent (3.7%) of pre-project single- and double-occupancy riders switched to using a freeway bus during the project. Almost all of the carpools with three or more people using the freeway prior to the project continued to travel on the freeway during the demonstration.

Of the 32.7% of single- and double-occupancy automobile drivers who reported leaving the freeway during the project, 27.9% of all such drivers switched to city streets, while the remaining 4.8% switched to other freeways. Not all of these drivers left the freeway during both the morning and evening peaks. Of the 377 non-carpoolers who reported switching to city streets, 66 (or 18%) did so during the morning only, while 49 (or 13%) did so only during the evening peak. Of the 65 non-carpoolers who reported switching to another freeway, 10 (or 15%) switched only during the morning, while an equal number switched only during the evening. The combined result of these defections would have been a 27.6% reduction in the number of non-carpoolers using the freeway during the Diamond Lane demonstration. This defection rate appears to be somewhat high in the light of the traffic vehicle volumes measured on the freeway during the project. Freeway vehicle volumes at Western Avenue dropped by 32% during the first seven weeks of the project, but subsequently rose to within 9% of pre-project levels. The apparent overstatement on the part of survey respondents may have been caused by a number of factors: (1) Seasonal increases in freeway travel may have masked the actual extent of the defection to city streets; (2) The survey responses may be biased by the presence of a disproportionately high percentage of respondents who were severely inconvenienced by the project, and hence who had more motivation for responding to the survey; and (3) There was evidence of a certain amount of confusion and contradiction in some of the survey responses to questions regarding shifts during Diamond Lane operation. An editing routine was devised to eliminate obviously contradictory responses. However, several possibilities for misinterpretation remain, including the possibility that a respondent would report switching to a surface street when he only made such a switch a limited number of times on a trial basis.

Only 4.8% of single- and double-occupancy vehicles on the freeway prior to the demonstration reported switching out of the corridor to other freeways for their daily journey. Freeways most often mentioned as alternate routes were the San Diego Freeway, the Hollywood Freeway, the Harbor Freeway, and the Ventura Freeway.

Termination of the project resulted in the return of many of those riders who had changed to other routes during the project. Of those using the Santa Monica Freeway before the project, 92.2% responded that they are again traveling on the freeway; 83.3% of the single- and double-occupancy cars changing to city streets during the project had returned to the freeway following the project. The vast majority (95.9%) of the respondents who reported switching to another freeway had returned to the Santa Monica Freeway after the close of the demonstration but, for the most part, drivers who did not return would not have had a chance to respond to the survey.

5.8.1.2 Route Changes Reported by Surface Street Drivers

A small percentage (15.4%) of drivers using the city streets before the project reported switching to the freeway during the Diamond Lane demonstration. Surprisingly, none of the drivers reporting making the switch participated in three-person carpools. Only seven respondents reported driving on the city streets with three or more persons per vehicle prior to the project, and all seven of these remained on the surface streets during the demonstration. Except for one respondent who reported switching to the bus, all of the city street users who reported switching to the freeway drove single-occupant vehicles before and during the demonstration. Furthermore, only 4.4% of those former surface street users who reported switching to the freeway during the demonstration returned to the city streets following the demonstration, suggesting that something other than the Diamond Lanes attracted them to the Santa Monica Freeway.

5.8.1.3 Driver Experimentation During the Demonstration

Survey respondents who reported no change in their usual pattern of travel during the Diamond Lane operation were asked whether they experimented with any of a number of alternatives before deciding not to change their basic travel habits. Of 2,849 respondents, 1,236 -- or 43 percent -- said they had temporarily tried at least one of the alternatives identified in the survey. If the 548 respondents who identified a lasting change during Diamond Lane operations are added to the number who experimented with alternative routes and modes, roughly 63 percent of the survey respondents altered their travel patterns in some way at least once during the Diamond Lane demonstration. Several respondents reported trying and abandoning more than one alternative route or mode during the demonstration. The relative popularity of the different experimental changes reported by survey respondents is indicated in Table 5.29.

TABLE 5.29

RELATIVE POPULARITY OF TEMPORARY OR EXPERIMENTAL

TRIP CHANGES REPORTED BY 1,236 SURVEY RESPONDENTS

(43% of All Respondents)

	Survey Response	Frequency
1.	Used the Bus But Didn't Like It	3.8%
2.	Tried to Form Carpool But Couldn't	6.5%
3.	Rode in a Carpool But It Didn't Work Out	2.9%
4.	Tried Different Entrances to the Santa Monica Freeway	15.1%
5.	Tried Alternate City Streets	26.5%
6.	Started at Different Times	32.3%
7.	Used Another Freeway	7.1%
8.	Tried Some Other Experiment	5.8%
	Total	100.0%

5.8.1.4 Effect of Ramp Bypasses - Before the Diamond Lanes were implemented on March 15, 1976, bypass lanes for buses and carpools with two or more occupants had been installed on many of the on-ramps to the Santa Monica Freeway. Survey respondents were asked whether the installation of these ramps had caused them to change their normal routes or form a two-person carpool prior to Diamond Lane implementation. Nearly 25% of all respondents reported changing their travel patterns in some fashion with the introduction of the bypass lanes. Most of those reported changing their routes to avoid ramps having a bypass lane. A summary of the responses received to the ramp bypass question appears below:

SUMMARY OF REPORTED TRIP CHANGES DUE

TO RAMP BYPASS LANES BEFORE THE

DIAMOND LANES WERE IMPLEMENTED

	Type of Change	Percent of Responses
1.	Changed Route to Use a Bypass Ramp	3.9%
2.	Changed Route to Avoid a Bypass Ramp	19.5%
3.	Joined or Formed a Carpool	1.1%
4.	Didn't Make a Change	75.5%
	Total	100.0%

5.8.2 Corridor Balance Sheet

Attempts to develop a balance sheet charting the whereabouts during the demonstration of all those corridor travelers observed on the freeway and surface streets before the project began are doomed to failure. The unknown effects of seasonal traffic variations, coupled with the difficulty of monitoring all surface streets and the ability of drivers to wander in and out of the corridor at will, or even cease making trips entirely, all make it impossible to develop a ledger accounting for the comings and goings during the demonstration of a population observed prior to the project. Nonetheless, it is instructive to attempt such a ledger-balancing, if only to demonstrate the relative magnitudes of apparent shifts in travel patterns.

Table 5.30 compares counts of vehicles and people observed on the Santa Monica Freeway and on a sampling of seven surface streets before and during the Diamond Lane demonstration. The table includes estimates of traffic diverted to other freeways and trips rescheduled during the midday hours when Diamond Lane regulations were not in effect. If it were possible to trace every traveler observed prior to the project, and prohibit entry to new travelers during the project, the total number of people observed before and during the project would balance in Table 5.30. The largest discrepancy between travelers observed before and during the project occurs during the first seven weeks of the demonstration, when the number of travelers accounted for in the balance sheet is 13% lower than the number observed prior to the project. It is likely that a large portion of this 13% were diverted to city streets not included in the sample or were experimenting briefly with other freeway routes. By the last seven weeks of the project, the number of travelers accounted for in the balance sheet is slightly greater than the number observed prior to the demonstration. Considering the entire corridor sample recorded in Table 5.30, former Santa Monica Freeway users traveling on different freeways or in different time periods by the last seven weeks of the project, 1% more people were traveling in 5% fewer vehicles than were being used prior to the demonstration.

5.9 POSTSCRIPT

One writer commented that after the Diamond Lane project, "...the fiercely independent Angelinos were back where they started - bumper-to-bumper in four lanes instead of three."[5] Measurements made following the project in October 1976 suggest that the corridor drivers did find themselves back where they started once the Diamond Lanes disappeared. However, being bumper-to-bumper in four lanes instead of three brought about significant improvements in freeway speeds and travel times.

TABLE 5.30: CORRIDOR COUNT COMPARISON AT WESTERN AVENUE SCREENLINE (Freeway Volume from Crenshaw Blvd. Sensors for 7 Hours of Diamond Lane Operation)

	Before	DURING 1st 7 weeks	DURING 2nd 7 weeks	DURING Final 7 Weeks	Average During
VEHICLES					
Freeway	113,135	76,738	97,197	101,678	91,871
Carpools	3,479	4,345	4,923	5,749	5,006
Other Auto	109,620	72,118	92,118	95,790	86,713
Project Buses	36	162	156	139	152
Surface Street Sample	44,067	49,214	43,637	42,248	45,033
Total Corridor	157,202	125,952	140,834	143,926	136,904
Estimated Midday Diversion+		1,231	1,231	1,231	1,231
Estimated Diversion to Other Freeways *+		4,385	4,385	4,385	4,385
Totals	157,202	131,568	146,450	149,542	142,520
PEOPLE					
Freeway	138,873	101,643	128,180	136,421	122,081
Carpool**	11,829	14,773	16,738	19,547	17,019
Other Auto	125,873	83,778	107,873	113,064	101,572
Project Buses	1,171	3,092	3,569	3,810	3,490
Surface Street Sample	57,737	63,497	57,012	55,953	58,821
Total Corridor	196,610	165,140	135,192	192,374	180,902
Estimated Midday Diversion+		1,372	1,372	1,372	1,372
Estimated Diversion to Other Freeways *+		4,889	4,889	4,889	4,889
Totals	196,610	171,401	191,453	198,635	187,163

* From survey responses, 4.0% of single & double occupant autos switched to other freeways during both the A.M. and P.M., while an additional 1.4% switched during either the A.M. or the P.M. Effectively, then, 4.0% of single- and double-occupant vehicles (3.3% + 0.5 X 1.4%) left the Santa Monica Freeway for other freeways during the peak period. The average occupancy for these vehicles was 1.115 occupants per car.

**Based upon an average of 3.4 persons per carpool.

+Figures not available by 7-week periods.

5.9.1 Vehicle Speeds

Table 5.31 summarizes speeds and travel times between Lincoln and Grand before, during and after the Diamond Lane demonstration. After the demonstration, computer records for August through November 1976 show that eastbound travel times during the morning peak averaged 17.7 minutes between Lincoln and Grand, 2-1/2 minutes less than the average time recorded during the demonstration. In the westbound direction during the evening peak, travel times were 16.7 minutes between Grand and Lincoln, 4.8 minutes less than the demonstration average. Eastbound travel times following the project were two minutes slower than those recorded prior to the demonstration, while westbound travel times were 1.4 minutes faster.

5.9.2 Volumes and Occupancy

Table 5.32 summarizes vehicle and passenger statistics following the project, and compares them with previously cited figures recorded before and during the demonstration.

TABLE 5.32

AVERAGE DAILY VEHICLE AND PASSENGER STATISTICS FOR CRENSHAW BOULEVARD

	Before Project	1st 7 Weeks	2nd 7 Weeks	Last 7 Weeks	After Project (10/76)	% Change After/Before
Total Vehicles	113,135	76,738	97,197	101,768	112,059	-1%
Total People	138,873	101,643	128,180	136,421	140,507	+1%
Bus Ridership*	1,171	3,092	3,569	3,810	2,916	+149%
Passengers/Vehicle (including buses)	1.23	1.32	1.32	1.34	1.25	+2%
Passengers/Vehicle (automobiles only)	1.22	1.29	1.28	1.31	1.23	+1%
Diamond Lane Carpools	--	3,879	3,955	4,497	--	
Non-Diamond Lane Carpools	3,479	466	968	1,252	3,652	+5%
Total Carpools	3,479	3,345	4,923	5,749	3,652	+5%

*SCRTD and SMMBL buses only.

TABLE 5.31: AVERAGE FREEWAY TRAVEL TIMES AND SPEEDS IN NON-PREFERENTIAL LANES

Time Period	Lincoln to Grand EB 6:30-9:30 AM Time (Min.)	Speed (MPH)	Grand to Lincoln WB 3:00-7:00 PM Time (Min.)	Speed (MPH)
Before Diamond Lanes				
• Before Eastbound Ramp Metering	22.7	36.2	18.4	43.6
• After Eastbound Ramp Metering	15.7	50.6	18.1	44.9
During Diamond Lanes				
• First Seven Weeks	21.3	39.1	25.3	32.0
• Second Seven Weeks	18.8	43.8	20.8	39.2
• Last Seven Weeks	20.5	41.1	19.5	41.9
• Average During	20.2	41.3	21.5	37.7
After Diamond Lanes	17.7	45.0	16.7	46.9

The post-project measurements, made in October 1976, show that the total number of vehicles recorded by the Crenshaw Boulevard sensors had returned to within one percent of pre-project levels, while the number of passengers using the freeway was slightly more than one percent higher than the corresponding levels prior to the demonstration.

The number of three-person carpools on the freeway dropped to within 5% of pre-project levels with the disappearance of the Diamond Lanes. However, the number of bus riders did not drop so sharply (see Section 6.5), so that the occupancy rate for all vehicles recorded following the project, 1.25 passengers per vehicle, remained slightly higher than the pre-project level of 1.23 passengers per vehicle. Even so, the post-project occupancy levels represented a significant drop from the Diamond Lane high of 1.34 passengers per vehicle recorded during the last seven weeks of the demonstration. Comparisons of automobile occupancy data taken after the project are clouded somewhat by discrepancies in the data populations being compared. Following the project, vehicle occupancy counts were made in both the peak and off-peak directions of travel, and it was observed that the occupancy rates for automobiles traveling in the off-peak direction were slightly higher than the rates for automobiles traveling in the peak direction of travel during the same period. (Morning occupancy rates were 1.22 passengers/auto in the off-peak direction, and 1.17 passengers/auto in the peak direction. Evening rates were 1.29 passengers/auto in the off-peak direction and 1.24 passengers/auto in the peak direction.) No occupancy counts were made in the off-peak direction prior to the project and it was assumed on the strength of past CALTRANS experience that the occupancy rates were equal in both directions. Thus, it is not known whether the demonstration had the effect of generating relatively more permanent carpools in the off-peak direction (perhaps because bus service was inadequate in that direction), or whether the original assumption of equal occupancies was in error. In the latter case, estimates of the number of carpools traveling in the off-peak direction prior to the project would have been slightly understated. Furthermore, the observation points for the before and after data in the westbound direction were slightly different during the evening hours. Occupancy observations made just before the project at Western Avenue during this time period proved unusable, and these observations were replaced with the best available substitute, a set of May 1975 observations taken one mile closer to the Crenshaw Boulevard sensors. These differences in the data base make it difficult to draw detailed conclusions regarding occupancy rate changes by direction and time of day before and after the project. However, there seems little doubt regarding aggregate behavior of the vehicle occupancy measure following the termination of the Diamond Lane demonstration. Occupancy counts made in both peak and off-peak directions following the demonstration combine with the survey findings to suggest the central conclusion that the return of non-carpoolers from city streets, coupled with the disbanding of some of the carpools formed to take advantage of the Diamond Lanes, caused the automobile occupancy rates following the project to drop to levels approaching those existing prior to the demonstration.

5.9.3 Ramp Occupancies and Violations

Immediately following the termination of the Diamond Lane demonstration, ramp metering rates were returned to pre-project levels. Bypass lanes for vehicles with two or more occupants remained in operation on 12 of the 30 freeway on-ramps. Automobile occupancy and violation counts were made by CALTRANS at each of these on-ramps before, during and after the Diamond Lane project. Table 5.33 presents the information obtained from these counts; changes in occupancy and violation rates with the initiation, and then termination, of the project are discussed below.

Occupancy Rates. Occupancy rates generally decreased after the demonstration. At only one ramp (Vermont eastbound) did counters note a higher occupancy rate after the project than before the project. In fact, average rates for both eastbound and westbound travelers were slightly lower (.01 persons/car) after the project than before the project. Eastbound occupancy rates rose about 5% with the project's start, and fell almost 6% at the end of the project; westbound rates rose slightly less than 8% and fell over 8% after the project.

Violation Rates. Violation rates on on-ramps (calculated by dividing the number of single-passenger automobiles observed using the bypass lanes illegally by the total number of automobiles using the ramp) soared with the end of the Diamond Lane project. On eastbound ramps, violations increased 76% from pre-project figures, and 209% from counts made during the project. Respective figures for westbound ramps are 59% and 95%. The initiation of the project witnessed a decrease in violations: 75% on eastbound on-ramps and 24% on westbound on-ramps. This decrease might be attributable to increased CHP presence on the freeway during initial weeks of the project. The negative attitude toward preferential lanes fostered during the demonstration, coupled with the termination of the Diamond Lanes on the freeway, may have suggested to many drivers that adherence to any similar occupancy restrictions on the on-ramps was no longer necessary. To the extent that violation rates continue to increase, the effectiveness of the ramp metering system in improving freeway speeds may be impaired.

TABLE 5.33: ON-RAMP VIOLATION & OCCUPANCY RATES

Location	Total Cars Observed During Peak Period			Vehicle Occupancy			Violations			Violation Rate (%) (Violations/Total Cars x 100)		
	Before	During	After	Before	During	After	Before	During	After	Before	During	After
EASTBOUND												
Cloverfield	3,468	2,428	2,082	1.20	1.31	1.21	0*	108	233	--	4.44	11.19
Bundy	1,926	2,085	2,281	1.29	1.34	1.24	99	57	271	5.14	2.73	11.88
Manning	1,564	1,261	1,606	1.34	1.50	1.31	55	39	94	3.51	3.09	5.85
Venice	1,231	1,105	803	1.41	1.42	1.34	137	33	105	11.12	2.98	13.07
Crenshaw	3,029	2,712	3,022	1.26	1.29	1.22	516	196	808	17.03	7.22	26.73
Western	2,170	1,967	1,613	1.25	1.30	1.26	111	52	117	5.11	2.64	7.25
Vermont	1,550	1,477	1,228	1.31	1.35	1.37	66	78	109	4.25	5.28	8.86
Total	14,938	13,035	12,635	1.27	1.33	1.26	984	563	1,737	6.58	4.31	13.74
WESTBOUND												
Hoover	1,996	1,210	1,388	1.33	1.48	1.34	70	65	164	3.50	5.37	11.81
Vermont	1,454	1,213	1,520	1.33	1.45	1.30	132	127	259	9.07	10.46	17.03
Western	1,142	1,093	1,061	1.37	1.44	1.38	158	112	177	13.83	10.24	16.68
Crenshaw	1,240	1,088	1,097	1.32	1.41	1.29	146	111	170	11.77	10.20	15.49
Fairfax	1,544	1,065	1,184	1.30	1.39	1.28	104	76	188	6.73	7.13	15.87
Total	7,376	5,669	6,250	1.33	1.43	1.32	610	491	958	8.27	8.66	15.32
Total: Eastbound & Westbound	22,314	18,704	18,885	1.29	1.36	1.28	1,594	1,054	2,695	7.14	5.63	14.27

* Ramp meter at Cloverfield was not operational before demonstration

CHAPTER 5 REFERENCES

1. SYSTAN, Inc., Evaluation Plan for the Santa Monica Freeway Preferential Lane Project, for the Transportation Systems Center, Urban Mass Transportation Administration, Contract No. DOT-TSC-1084, November 1975.

2. CALTRANS, Evaluation of the Diamond Lanes After Two Weeks of Operation, May 1976.

3. Los Angeles Times Editorial, March 21, 1976.

4. June 14 Report to Mayor Bradley from City Traffic Engineer S.S. Taylor.

5. Wilbur Smith and Associates, "Downtown Los Angeles Travel Surveys," prepared for the Southern California Rapid Transit District, Los Angeles, California, July 1975.

6. California Magazine, January 1977, Page 40, Report on Diamond Lane Project.

6.0 BUS OPERATIONS AND RIDERSHIP

This section describes the express bus service inaugurated at the time of Diamond Lane implementation, charts patronage on each of the routes using the Diamond Lane, relates patronage levels to service levels on each new bus line, and computes operator costs and revenues. The section begins with a detailed description of the new routes and service initiated by SCRTD and SMMBL (Section 6.1). Fare structures are defined, and the implementation process accompanying the introduction of the new service is chronicled. In Section 6.2, the new level of bus service is quantified in terms of area covered, population served, comparative travel times, and schedule reliability. Section 6.3 tabulates ridership levels on each line, reports on those rider characteristics identified in on-board surveys, isolates the effect of the Diamond Lane itself on bus patronage, and compares predicted and actual levels of patronage on the different bus routes. Finally, Section 6.4 discusses vehicle productivities and system economics on a line-by-line basis.

6.1 SYSTEM OPERATIONS AND IMPLEMENTATION

6.1.1 Operating Entities

Two bus operators participated in the Diamond Lane project via their inclusion in the UMTA grant application. The Southern California Rapid Transit District (SCRTD) is the major bus operator in the Los Angeles area, operating 2,400 buses in a four-county area. The Santa Monica Municipal Bus Lines (SMMBL) is a municipal company, operating about 100 buses in the Santa Monica area. Prior to the Diamond Lane project, SMMBL could not legally provide service to downtown Los Angeles; service was possible only as far as Pico Boulevard. Nor could SCRTD encroach on SMMBL territory. In order for both operators to provide express service from the Westside study area to downtown Los Angeles, then, a cooperative agreement was necessary. Such an agreement was necessary because certain existing sections of the California Public Utilities Code, which were developed to protect the patronage of various transit agencies in the State, are restrictive with respect to the establishment of new services by one agency if such new services are within the service area of another agency. To overcome these restrictions, SCRTD and SMMBL signed a cooperative agreement on April 24, 1975. This agreement, which was appended to the Project Grant Application (Reference 6.1), outlined the service to be provided during the Diamond Lane project.

6.1.1.1 Operating Authority. In addition to the cooperative agreement, both transit operators also had to receive authority from their governing bodies: for SMMBL, the City of Santa Monica and for SCRTD, its board of directors.

SCRTD. The enabling SCRTD legislation vested the establishment of new routes in its board of directors, as long as such routes were not in violation with other sections of the Public Utilities Code. Route establishment and changes are usually prepared by SCRTD staff for the consideration of the Bcard, and are acted upon the the board of directors at their twice-monthly meetings.

SMMBL. New routes and services of SMMBL are approved by the Santa Monica City Council. Such requests are prepared by the Transportation Department staff, and are acted upon at the weekly City Council public meetings.

6.1.1.2 Planning Agency. Under the Public Utilities Code, the Southern California Association of Governments (SCAG) has been appointed the transportation planning agency and the arbitrator of disputes between transit agencies in Los Angeles County. Documentation of routes and service areas were submitted to SCAG for inclusion in the official record.

6.1.1.3 Local Funding Agencies. As neither SCRTD nor SMMBL had sufficient funds to institute the new services to be operated under the demonstration, both agencies requested funding under the present agreement with the Los Angeles County Board of Supervisors. The procedure included approval of the proposed operating plan by the SCRTD Board of Directors and the Santa Monica City Council, submission to the Los Angeles County Road Commissioner, and review by the Road Department. At review end, the proposal was submitted by the Road Commissioner to the Board of Supervisors with his recommendation.

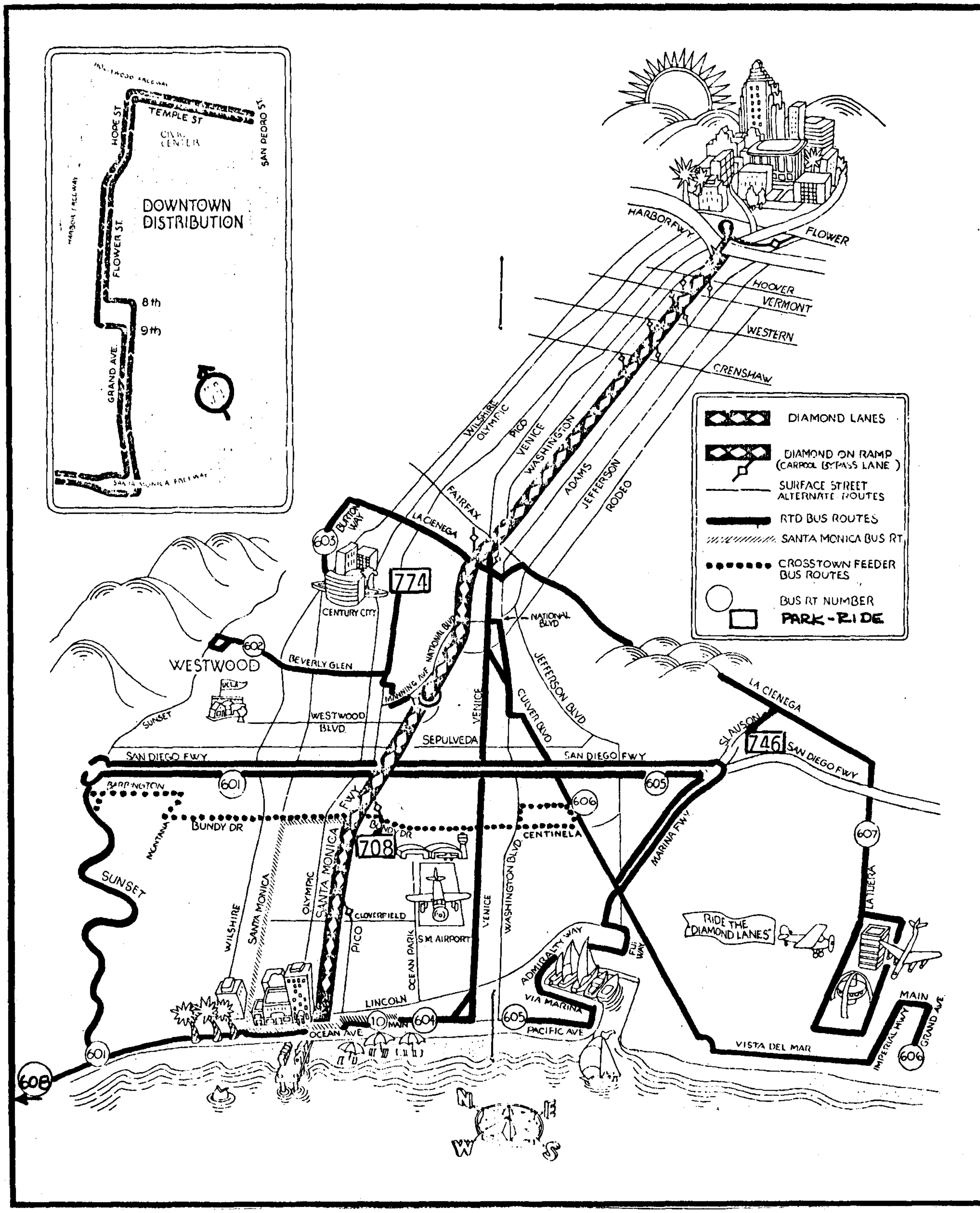
6.1.2 New Routes and Services

The implementation of the Diamond Lane project was accompanied by the introduction of four new feeder/express routes linking the Westside area to the Los Angeles CBD. In addition, four bus routes operated by SCRTD prior to the Diamond Lane project were able to take advantage of the preferential lane, and three routes were established to serve newly-opened Park-and-Ride lots.

6.1.2.1 Diamond Lane Feeder/Express Routes - On opening day of the Diamond Lane project, there were eight feeder/express routes: one operated by SMMBL and the other seven by SCRTD. Four of these SCRTD routes had been operating express service on the Santa Monica Freeway since June 1975 and on March 15, 1976, moved into the Freeway's preferential lane. On April 19, 1976, SCRTD added the #608 Malibu route, bringing the total to nine express routes. On July 6, 1976, the #603 line from Century City was cancelled for lack of patronage.

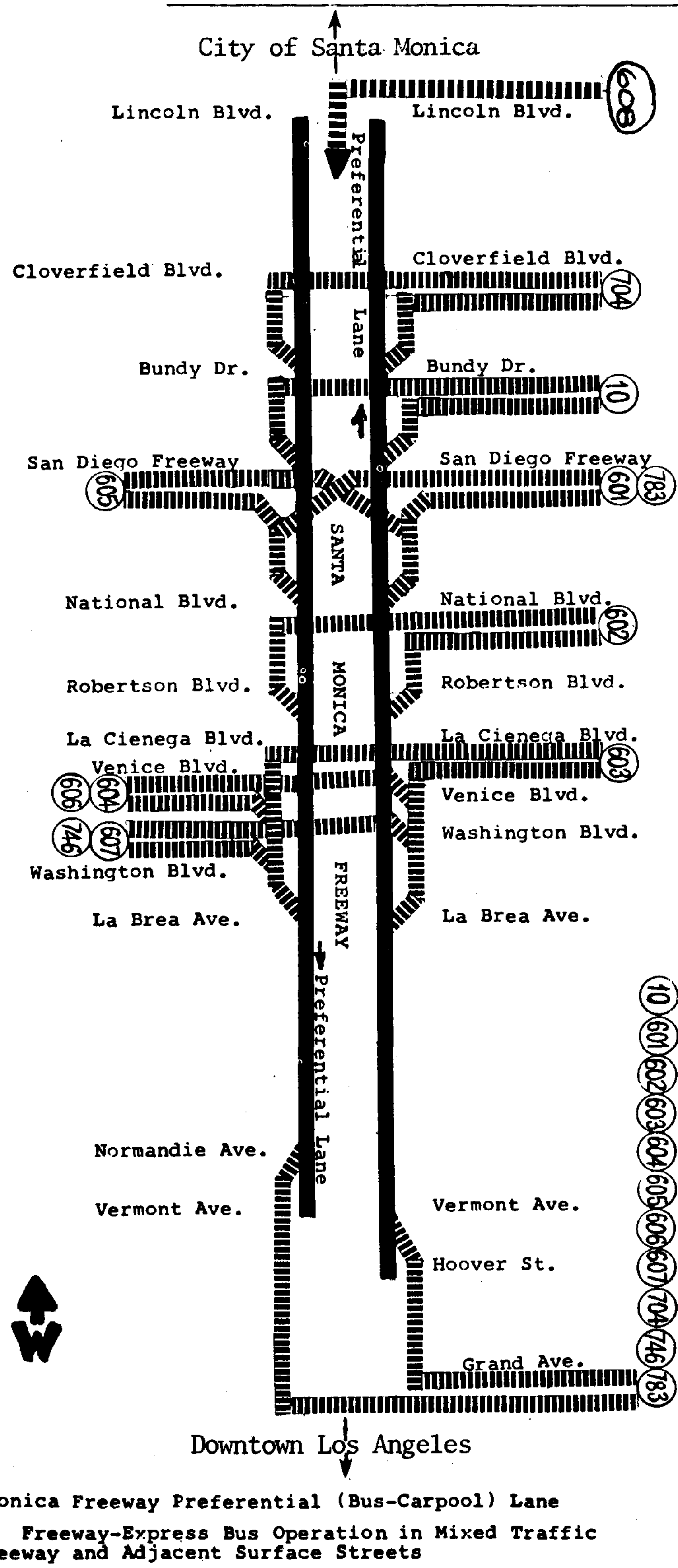
The nine feeder/express routes are illustrated in Exhibit 6.1 and their entry points onto the Santa Monica Freeway are illustrated in Exhibit 6.2. Exhibit 6.3 contains detailed route descriptions for each eastbound trip. The return trips are the reverse of the route described, except for minor deviations on Lines 603 and 606.

EXHIBIT 6.1: DIAMOND LANE BUS LINES (3-15-76)



Source: SCRTD, modified by SYSTAN.

EXHIBIT 6.2: ON-RAMP CONFIGURATION FOR S.M. FREEWAY



(Source: Modified from Santa Monica Freeway Preferential Lane Project Grant Application)

EXHIBIT 6.3

FEEDER/EXPRESS ROUTE DESCRIPTIONS

PRE-DIAMOND LANE ROUTES

Line 601 - Sunset Blvd. (SCRTD)
The bus started from the Pacific Coast Highway at Sunset Blvd., traveled through the Pacific Palisades area along Sunset Blvd. to the San Diego Freeway, which it followed until changing to the Santa Monica Freeway.

Line 604 - Venice Blvd. (SCRTD)
The route originated in the City of Venice area and followed Main Street, Windward Ave. & Pacific Ave. to Venice Blvd., where it entered the Santa Monica Freeway.

Line 605 - Marina Del Rey (SCRTD)
The route started at Washington Street and Pacific Avenue, traveled through the Marina Del Rey community and on to Via Marina, Admiralty Way, Fiji Way, La Villa Marina, Mindanao Way & the Marina Freeway before entering the San Diego Freeway, changing to the Santa Monica Freeway at their junction.

Line 606 - Culver Blvd. (SCRTD)
Starting with a local loop of Richmond Street, Grand Ave. and Main Street, the bus traveled to the Imperial Highway, Vista Del Mar, Culver Blvd., Washington Blvd., National Blvd., and Venice Blvd. before entering the Santa Monica Freeway from Benice Blvd.*

* On June 27, 1976, the route changed and began service further south from the Hermosa Beach and Manhattan Beach communities via Hermosa Ave., Vista Del Mar, picking up the old route at Culver Blvd. The local loop to El Segundo was thus eliminated from Line 606 and picked up by Line 607.

NEW ROUTES

Line 10 - Blue Diamond Express (SMMBL)
After local stops in the City of Santa Monica along Main Street, Ocean Ave. and Santa Monica Blvd., the bus entered the Santa Monica Freeway at Bundy Drive and Pico Blvd.

Line 602 - Beverly Glen Blvd. (SCRTD)
After proceeding from Sunset Blvd. to Beverly Glen Blvd., Pico Blvd. (Patricia Ave., Butterfield Road)** & Manning Ave., the bus entered the Santa Monica Freeway at National Blvd./Manning Ave.

Line 603 - La Cienega Blvd.-Burton Way (SCRTD)
The route proceeded from Century Park West and Constellation Blvd. to Avenue of the Stars, Santa Monica Blvd., Crescent Drive, Burton Way, and La Cienega, where at Venice Blvd. the bus entered the Santa Monica Freeway.

Line 607 - La Tijera Blvd., Los Angeles Airport (SCRTD)
After serving the Los Angeles International Airport, the bus traveled on Sepulveda Blvd., Manchester Ave., La Tijera Blvd., La Cienega Blvd. & Venice Blvd., entering the Santa Monica Freeway at the Venice on-ramp.
On June 26, 1976, the 607 line picked up the old 606 route segment serving El Segundo and no longer directly served the Los Angeles airport, instead picking up passengers at Sepulveda from an airport mini-shuttle bus operated by RTD.

Line 608 - Malibu, Pacific Palisades (SCRTD)
On April 19, a new express route was added to Diamond Lane service. Starting in Malibu, it traveled on Civic Center Road to the Pacific Coast Highway, Sunset Blvd. and Temescal Canyon Road in the Pacific Palisades area, returning to the Pacific Coast Highway into Santa Monica where it joined the Santa Monica Freeway.

** The route streets in parentheses were changed on May 24, 1976 to Overland Ave., National Blvd., Motor Ave. and Burton Way in response to the Cheviot Hills Homeowners Association's request to remove the service from their residential streets. The controversy also involved the necessity of Culver City's approval for the route change, since their municipal bus line operated in that area. At that time, Culver City was at odds with the Diamond Lane project over the "illegal" establishment of the Fox Hills Park-and-Ride lot.

6.1.2.2 Park-and-Ride Program - CALTRANS includes Park-and-Ride facilities as a supplement to its Preferential Treatment Program. Therefore, in conjunction with the implementation of the Diamond Lane project on the Santa Monica Freeway, three Park-and-Ride lots with associated bus routes were opened and operating on March 15, 1976. Exhibit 6.1 maps lot locations and route lines, while Exhibit 6.4 provides detailed descriptions of Diamond Lane express service to downtown Los Angeles from the three Park-and-Ride lot locations.

The thought behind the lot operation was that part of the area to be served was not within walking distance of a bus route, and the use of the car as a feeder to bus service would expand the potential transit coverage in the area. Park-and-Ride lots were to provide "an assured space with constant protection for the potential transit user as well as carpoolers....(and provide) other advantages to the bus use because of the fact that a large number of people congregate at one location: (1) a station or waiting shelter is justified; (2) more frequent service is justified; and (3) non-stop service to the LA CBD can be provided."[1]

The following characteristics were initially established by SCRTD as desirable criteria for lot locations (Reference 6.1 and SCRTD):

1. Proximity to freeway or major arterial surface street;
2. Easy access to the freeway or local surface street;
3. Minimum size, at least 200 car capacity;
4. Cost less than $6 to $8 per space per month;
5. Remote from any large geophysical obstacle (e.g., a mountain that would limit access or reduce population in drawing area); and
6. At some distance from downtown Los Angeles.

Early setbacks in obtaining desired sites for Park-and-Ride lots caused several of these criteria to be relaxed. Descriptions of the locations of the Park-and-Ride lots selected follow.

Santa Monica (served by Line 708)

The original site at Colorado and Cloverfield planned for this Santa Monica service was rejected prior to the opening of the Diamond Lanes because of unsuitable soil conditions of this old fill site and the high cost of the property. A second location at Centinela and Ocean Park Boulevard was leased for six months at $3,200 per month from McDonnell Douglas Corporation. The lot was actually two parcels of land across the road from one another. The parcels were paved but not fenced, and early response (calls to the telephone center during early project operation) from potential users indicated that the lots were difficult to find and there was no SCRTD sign to identify them. Two Park-Ride Lot signs soon became part of the lots. A lot attendant was present during the day until August 1.

EXHIBIT 6.4

PARK-AND-RIDE ROUTE DESCRIPTIONS

PARK-AND-RIDE SERVICE

Line 708 - Santa Monica

From the lot in East Santa Monica at the corner of Centinela and Ocean Park Blvd., the bus traveled via Ocean Park Blvd. and Bundy Drive to the Santa Monica Freeway approximately one-half mile away. After the Diamond Lane project was terminated on August 13, 1976, this service was cancelled effective September 1, 1976.

Line 746 - Fox Hills

From the lot located north of Slauson at the intersection of the Marina Freeway and Slauson (just east of the Fox Hills shopping mall), the bus followed La Cienega Blvd. for about five miles to the Santa Monica Freeway. This line was also cancelled effective September 1, 1976.

Line 774 - Sepulveda/Century City

For three of the eight morning peak period trips, the bus began its run at the Sepulveda Drive-in Theatre in the San Fernando Valley, entered the San Diego Freeway at Burbank Blvd. and exited at Santa Monica Blvd. to join the Century City service. This trip segment was approximately 17 miles, 13 of which were on the San Diego Freeway. All of the bus trips left the Century City park-and-ride lot, traveled on Pico Blvd., Patricia Ave., Butterfield Road, Manning Ave., and National Blvd. (a distance of approximately three miles) before entering the Santa Monica Freeway.

The Diamond Lane segment of the route from Century City to downtown Los Angeles was cancelled on May 10, 1976 for lack of patronage.*

* This route was also a subject of controversy along with SCRTD Line 602, because it traveled through the Cheviot Hills residential area.

Fox Hills (served by Line 746)

This site was originally purchased by CALTRANS for Route 90 freeway right-of-way expansion. When expansion plans were rescinded, CALTRANS attempted to sell the property but it was rezoned by Culver City effecting a lowering of the value of the property. CALTRANS filed suit charging arbitrary down-zoning. This situation existed at the time of Diamond Lane implementation. CALTRANS then leased the site to SCRTD for $800 per month. The site was fenced but needed some paving and maintenance work. A lot attendant was on duty during the day until August 1.

Century City (served by Line 774)

This lot, located in the Century City development, was leased to SCRTD for a charge of $4 per space per month. This lot was fenced with an attendant at the entry. The developers hoped to draw traffic to the area, which was isolated because of the lack of residential development and land acquired for future expansion which had not materialized. The developers also wanted to draw service from the San Fernando Valley area. An immediate problem occurred with the access route to the freeway through the Cheviot Hills residential area, and ridership failed to develop. The first choice of a lot site was part of an old Veterans Administration facility in Westwood, but insurmountable problems arose when SCRTD attempted to secure a release for the Park- and-Ride lot from the Federal government.

6.1.2.3 Feeder Routes - Although there were originally four feeder routes planned by SMMBL to increase access to the express buses traveling to the Los Angeles CBD, only one (Line 14) was initiated. The three other proposed lines were planned to serve the anticipated Westwood Park-and-Ride lot, and abandoned when this lot could not be used.

Line 14 - Bundy/Centinela

This entirely new north-south crosstown service proceeded from Sunset Boulevard and Barrington Avenue via Barrington Avenue, Montana Avenue, Bundy Drive, Centinela Avenue, Washington Boulevard, Inglewood Boulevard and Culver Boulevard to Centinela Avenue south of Santa Monica. The bus returned from Centinela Avenue and Culver Boulevard via Centinela, Bundy Drive, Montana Avenue and Barrington Avenue to Sunset Boulevard. Transfer to a Diamond Lane bus was possible at the last stop before the freeway at Pico Boulevard and Bundy Drive.

6.1.2.4 Downtown Distribution Pattern - The distribution route in downtown Los Angeles was the same for all bus lines (see Exhibit 6.1). The path from the freeway off-ramp at 18th Street and Grand Avenue (the on-ramp is at 17th Street and Grand Avenue) followed Grand Avenue to 8th Street, traveled west two blocks to Flower Street, followed Flower Street through the downtown business area to Temple Street where it turned east, passing many of the government buildings. There were 20 bus stops made inbound and 19 outbound to the freeway. The scheduled downtown distribution trip required 19 minutes from the time the bus exited the freeway to the end of the line.

6.1.3 Equipment and Drivers

Information on equipment and drivers supplied by the bus companies is supplemented by results of two surveys:

SCRTD Diamond Lane Bus Operators Survey (August 5-6, 1976): This survey, distributed in bus Divisions 4 and 6, had a low response rate of 42 surveys (25-30% of Division 6; 9 responses from Division 4), but provides a useful record of drivers' opinions and attitudes on the operation.

On-Board Bus Surveys (SCRTD, June 30, 1976; SMMBL, August 12, 1976): In the two sections of these surveys, numerous passengers' comments were received on both bus equipment and drivers.

6.1.3.1 Equipment. The SCRTD used standard full-sized transit buses on the preferential lane. SCRTD project plans proposed that buses be air conditioned, have deluxe seats and be capable of operating at speeds of 55 to 60 miles per hour. However, SCRTD was faced with an equipment shortage partially caused by an expansion of new services, and the buses used were not up to earlier expectations. The SMMBL equipment was to be taken from the equipment pool used to provide regular service.

A difference in operating policies resulted in a difference in equipment assigned to the project. SCRTD was directed to spread all their bus equipment evenly throughout the region, resulting in a mix of new and old buses for Diamond Lane service. The average age of the buses used therefore approximated the average age of the fleet, which was estimated to be 9.7 years at the start of the project. The SMMBL policy was that bus equipment be assigned by the length of the route, with newer buses going to the longer routes. Line 10, a twelve-mile route, thus received the newer equipment. Of eleven buses operating, seven were 1973 General Motors and four were 1976 AM General; the average age of the buses was 2.3 years.

In the SCRTD bus operator survey, 54% of the drivers reported "mechanical or other problems" with their Diamond Lane buses. These problems concerned underpowered buses (with a top speed of 45 miles per hour in some cases). Two drivers reported being pulled over by the CHP for traveling too slowly. When drivers were asked their opinion on what improvements would increase ridership on the Diamond Lane lines, the highest percentage (24%) indicated better quality buses.

During the on-board bus survey, riders were asked their opinion of the new service and were given an opportunity to comment further. While the majority of comments on equipment were complaints regarding bus temperature controls (53 of 92 equipment comments), ten were commented on the age of the SCRTD equipment. In general, however, the overall bus service was considered satisfactory by nearly 95% of the riders surveyed.

6.1.3.2 Drivers - SCRTD drivers operated from the Agency's Division 4, a low-seniority group in which the new drivers experienced difficulties with the unfamiliar routes, and Division 6, which experienced a large turnover in drivers (72 new drivers) during the annual SCRTD system driver assignment selection "shake-up" in June 1976.

In commenting on Diamond Lane bus service, riders on the SCRTD lines commented on the lack of driver route knowledge (31 of the 59 comments about SCRTD drivers), while another 18% of the comments remarked on driver courtesy. Comments on SMMBL driver courtesy made up 15 of the 19 comments on drivers received, with no comments on route problems.

An SCRTD report on the driver survey stated, "The primary conclusion of this survey is that the drivers were generally very happy with the Diamond Lane operation. Ninety-three percent of the drivers responded that the operation was good or excellent. There were minor problems entering and leaving the lane; however, these problems did not occur everyday."[4]

It had been anticipated that slow-moving carpools would interfere with bus operation; however, 73% of the drivers surveyed reported little problem with carpools slowing down the bus in the Diamond Lane. Forty-three percent of those surveyed thought the regulation specifying that Diamond Lane buses cannot exceed the speed of general traffic by more than 35 m.p.h. was a reasonable one; 23% felt the limit should be raised, most suggesting to 45 m.p.h. Suggestions on possible service improvements were varied; 20% experienced problems getting onto the Freeway at the on-ramps, and most complained of the Grand Avenue on-ramp in downtown Los Angeles. When asked about possible route improvements, most of those who offered a suggestion wanted a better freeway access point than congested Grand Avenue.

6.1.4 Fares

The SCRTD fares in effect during the Diamond Lane project are shown in Table 6.1. Both SCRTD and SMMBL instituted systemwide fare changes during the course of the project. The SCRTD fare increase on July 1 came after prolonged meetings regarding the level of bus subsidies. These meetings with the Los Angeles County Board of Supervisors focused on the fiscal year-end County cash flow problem, the necessity for County budget cuts in the new fiscal year, and the competition for funds between County-provided services. The pros and cons of providing Diamond Lane service were also heatedly debated during the Supervisors' meetings. The 25¢ fare was viewed as "unrealistic" by the majority of the Board, and their final lowered subsidy figure of $6.8 million for fiscal year 1976-77 to SCRTD was based on a 35¢ fare and resulted in a cutback in Diamond Lane service.

SMMBL fares were 50¢ or two tokens (five tokens cost $1.00) beginning March 15, with free transfers between SMMBL buses and 10¢ transfers to SCRTD buses. The County budget cuts affected Santa Monica's bus operations, and their subsidy level was also reduced. On August

TABLE 6.1

SCRTD FARE STRUCTURE

SCRTD Lines	One-Way Fare			Monthly Pass		
	3-15-76	7-1-76	Increase	3-15-76	7-1-76	Increase
One Zone:						
602, 604 pt, 606 pt, 607 pt	25¢	45¢*	80%	$10.00	$14.00	40%
746 Park-Ride, 774 Park-Ride	50¢	65¢	30%	$18.00	$25.00	39%
Two Zone:						
601, 604 pt, 605, 606 pt, 607 pt, 608	50¢	80¢*	61%	$18.00	$25.00	39%
708 Park-Ride	75¢	$1.00	34%	$27.00	$37.50	39%

*Base fare + 10¢ premium for Diamond Lane service.

2, Blue Diamond bus fares were increased to 80¢, a 60% increase, or three tokens (60¢), a 50% increase. During July, when the SCRTD fare increased, SMMBL reported some defection of SCRTD passengers to SMMBL Line #10.

Discount fares remained the same throughout the project, as shown below:

	SCRTD	SMMBL
Senior Citizens/ Handicapped	10¢	10¢
Students	15¢	12.5¢*
Transfers	10¢	Free to SMMBL buses; 10¢ to SCRTD buses

*A card with ten punches sold for $1.25.

6.1.5 Implementation Process

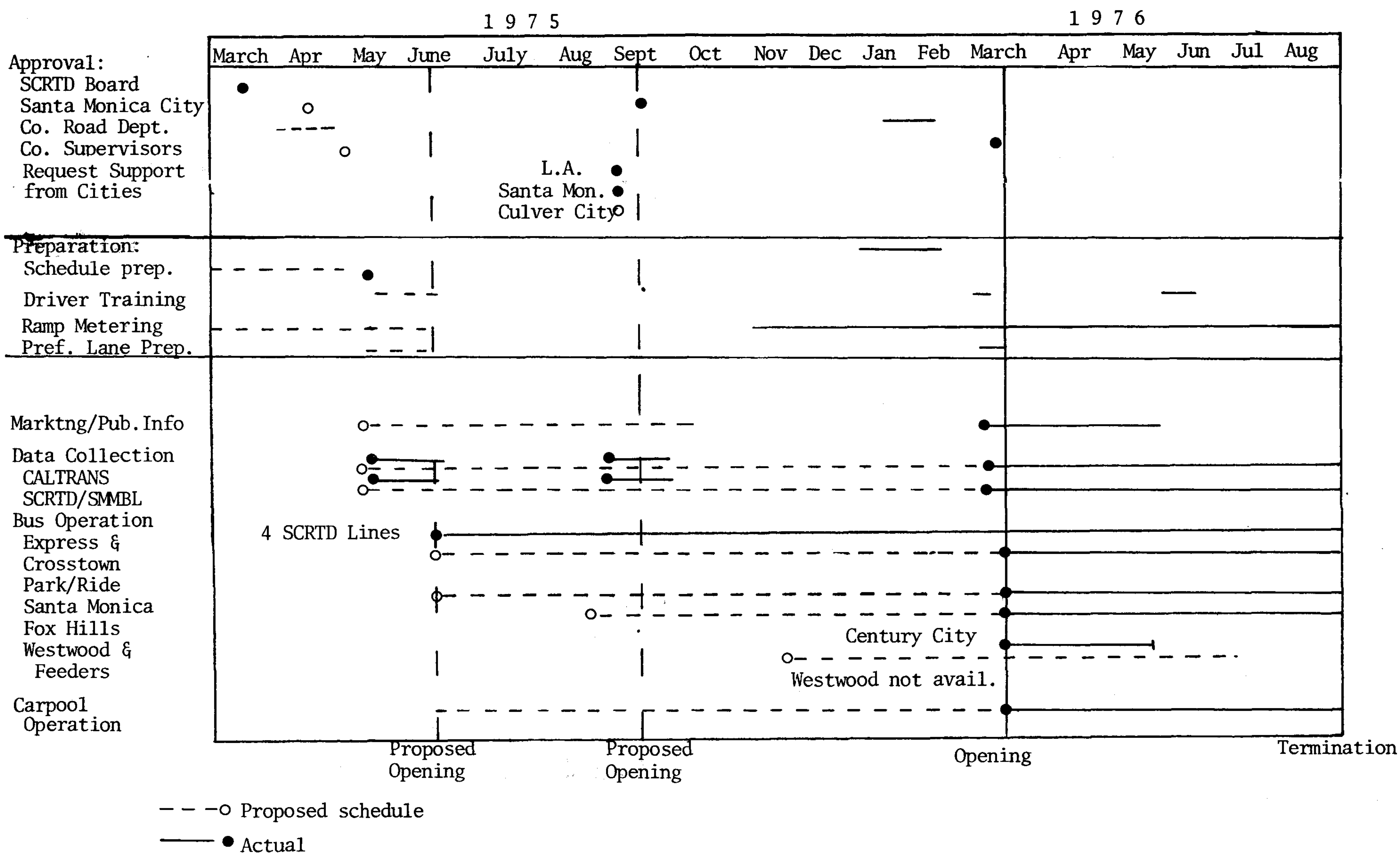
The Diamond Lane project went through two false starts before finally opening on March 15, 1976. Prior to this opening date, two previous implementation dates had been set and cancelled: June 16, 1975 and September 29, 1975. The idea of a Santa Monica Freeway preferential lane project began in 1973 and was included in the SCAG short-range transportation plan adopted in April 1974. The implementation schedule, as outlined in the UMTA grant application of April 1975, assumed the mid-June 1975 opening (see Exhibit 6.5). This schedule illustrates the timing needed and steps required to carry out the project. This proposed schedule was updated for the actual project opening.

The subsequent delays experienced in implementation can be seen as having both negative and positive effects on bus operations. On the negative side:

- Arrangements for facilities and equipment were made and then had to be postponed or amended;
- The uncertainty of the situation caused a "flattening" of interest on the part of many project participants; and
- Key project personnel changed, especially within the State Department of Transportation, which meant new people had to be educated to the project and the issues involved, particularly some unresolved technical issues.

On the positive side, the delays allowed opportunities for change and "fine tuning" of some evaluation aspects:

EXHIBIT 6.5: PROJECT IMPLEMENTATION SCHEDULE



- The four early bus line operations in 1975 allowed evaluation of the effects of new bus routes separate from the preferential lane effects.

- All three Park-and-Ride lots were ready by the March 15 opening day.

During the implementation delay, the hours of operation, originally scheduled for a 24-hour period, changed to a 13-hour period and again to an 8-hour period (6-10 AM and 3-7 PM both eastbound and westbound).

The following are the major milestones on the path to a March 15, 1976 initiation of Diamond Lane bus service:

May 1975 -- Implementation of the project was delayed until September 29, 1975 as a result of concerns regarding funding availability. The funding problems were with Los Angeles County and the annual SCRTD subsidy appeal. The Chief Administrative Officer, with input from the County Road Department, review set aside a $12.1 million SCRTD subsidy instead of the $38.5 million asked for. SCRTD had estimated a Diamond Lane operations cost of $2.1 million per year with a $500,000 revenue for a $1.6 million deficit. At this time, the project was planned as a 24-hour-per-day, seven-day-per-week operation. The amount finally authorized was $15.4 million.

June 1975 -- SCRTD phased in four of the planned Diamond Lane bus lines on the Santa Monica Freeway operating in mixed flow traffic providing express service to downtown Los Angeles.

September 1975 -- Santa Monica City Council officially voted to support the project, ensuring the participation of SMMBL.

September 3, 1975 -- The implementation date was delayed for 30 days by SCRTD's concern with federal labor restrictions imposed by Section 13c of the National Mass Transportation Act of 1974. Under this provision, transit agencies cannot "worsen" working conditions of employees if they are to qualify for UMTA operating assistance. The interpretation of this provision was that it would require SCRTD to pay operators' wages for up to six years if the Diamond Lane project were discontinued at the end of the one-year trial period. The provision was attached to a bus improvement package of five projects submitted to UMTA by SCRTD, amounting to a $16.5 million subsidy. The delay was a surprise announcement and occurred just prior to scheduled initiation of the marketing/promotion program.

October 20, 1975 -- The Joint Project Board (the policy board made up of the four operating agencies) officially rescheduled the Diamond Lane opening for March 15, 1976 in response to several problem areas, including the fact that the SCRTD Board of Directors had not yet resolved the difficulties with Section 13c of UMTA Section 5 operating funds.

January 1976 -- SCRTD Board of Directors received a ruling resolving the dispute over labor restrictions imposed by Section 13c of the UMTA Act of 1974. The project board reached a compromise calling for a 13-hour (6 AM to 7 PM) operation in both directions, which was agreed upon for reasons of safety, enforcement, operation and midday carpool formation.

February 6, 1976 -- The Joint Project Board revised the hours of preferential lane operation in response to objections raised by members of the Los Angeles City Council. The operating hours were set at 6-10 AM and 3-7 PM in both directions.

March 1, 1976 -- A press conference was held announcing the opening of the Diamond Lanes. The bus operators announced that they were "ready to go," though funding was still unresolved. The first project press release was sent out with details of Diamond Lane operation. In cooperation with the Los Angeles Mayor's office, a telephone center was established to provide information on Diamond Lane operation and as a channel for the expression of public opinion. The center received about 200 calls per day, most requesting bus information.

March 2, 1976 -- First advertisement appeared in newspapers announcing that the Diamond Lane is "opening soon." The advertisement included a coupon to send in for a rider's kit of information on the new bus services. During the first week, approximately 500 kits were sent out. The project implementation date of March 15, 1976 was formally verified and publicly announced as the County Board of Supervisors voted unanimously to table the last-minute recommendation by the County Administrative Officer to delay all new transit projects in an effort to balance the County's financial budget.

March 3, 1976 -- CALTRANS personnel handed out pamphlets announcing the project start at the Santa Monica Freeway on-ramps. The pamphlets included a postcard to mail in for bus rider information. In addition, SCRTD information booths were supplied with new service schedules.

March 15, 1976 -- SCRTD put the rest of their express bus routes into service. SMMBL began their new service route to downtown Los Angeles. All buses were then operating in the preferential lane. The three Park-and-Ride lots were opened. Carpools were sharing the Diamond Lane with buses.

During Diamond Lane operation, the participating bus companies made service level changes in response to increased and decreased ridership. Changes in service frequency are chronicled in the following section.

6.2 LEVEL OF SERVICE IMPROVEMENTS

The new bus services introduced at the time of Diamond Lane implementation represented a substantial improvement over the existing levels of service. This section compares such measures of service as coverage, travel times, and reliability before and after project implementation.

6.2.1 Coverage

Some form of local bus service existed throughout most sections of the study area prior to project implementation. The only bus routes opening significant amounts of new territory were the Beverly Glen segment of SCRTD Route 602 and the SMMBL Feeder Route 14 operating on Bundy Drive and Centinela in Santa Monica. Although several local routes criss-crossed Western Los Angeles prior to project implementation, freeway express service to the CBD was unavailable in many sections of the study area. No express service was available between SCRTD Line 601 operating on Sunset Boulevard to the north of the study area and SCRTD Line 604 operating on Venice Boulevard south of the Santa Monica Freeway. Similarly, no express service was available from the airport to the CBD. With the implementation of the Diamond Lane project, these service gaps were filled and the level of express bus service to the Westside study area increased dramatically.

On the basis of updated origin-destination data from the 1967 Los Angeles Regional Transportation Study (LARTS), the addition of four new multi-stop "feeder/express" routes (SCRTD Lines 602, 603, 607 and SMMBL Line 10) to the feeder/express routes serving the Westside area prior to the Diamond Lane project more than doubled the number of CBD work trips within reach of express service. An estimated 3,000 CBD work trips were within walking distance of the four SCRTD lines in existence prior to the Diamond Lane project (Reference 6.1). The four new Diamond Lane feeder express routes brought an additional 3,000 trips within walking distance of express bus service. The three new Park-and-Ride lots further increased the number of Westside residents who had express bus access to the CBD. An initial estimate of the potential market for Park-and-Ride lots (Reference 6.1) identified an additional 6,000 CBD workers whose route to the CBD brought them within the service area of a Park-and-Ride lot. In practice, relatively few workers living at any distance from the lots found it convenient to use them.

Prior to the project, SCRTD offered 18 express bus trips every morning from the Westside study area to the CBD. On the first day of the project, the number of express bus trips offered by both SCRTD and SMMBL during the A.M. peak totaled 74, an increase of more than four times pre-project levels. The marked improvement in service significantly improved the travel time by bus from most sections of the study area to the CBD.

6.2.2 Travel Times

6.2.2.1 In-Vehicle Times - Earlier investigations of trip time by mode have been compared to bus and automobile travel times before and after project implementation from various points in the Westside study area to the Los Angeles CBD (see Section 5.4.2 and Table 5.14). This comparison showed that trips from fourteen sample locations within the Westside study area required an average of 57 minutes prior to the initiation of freeway express service in advance of the original Diamond Lane implementation data of June 15, 1975. Following the introduction of all Diamond Lane express services on March 15, 1976, these same trips required an average of 33 minutes, an improvement of 42%. Bus travel times were constructed directly from bus schedules, and did not include the initial waiting time or an allowance for lateness. Each trip requiring a change of buses was assessed a five-minute penalty for each transfer required. The average automobile travel time for the same trips was 22 minutes prior to the project. During the project, single-occupant autos using the freeways for these trips spent 25 minutes in transit, while two-person carpoolers required 24 minutes and Diamond Lane users required 20.6 minutes. Automobile travel times were constructed from the before and after speed runs made on major arterials and the Santa Monica Freeway itself, with appropriate ramp delays added to the total travel time for non-carpooling automobiles.

Examination of Table 5.19 in the previous section shows striking bus travel time savings for most of the new routes introduced as a part of the Diamond Lane project. Automobile travel times were generally much faster than bus travel times throughout the study area, but the bus became more competitive as the distance from the CBD decreased, and was actually quicker than non-carpool travel during the demonstration for two of the 14 trips examined.

6.2.2.2 Service Frequencies - Service headways on new routes were made as attractive as possible in the initial stages of the demonstration and adjusted in response to ridership over the length of the project. In general, a standard of 15-minute headways during the peak hour was established, with service before and after at slightly longer intervals. Exceptions to this standard were made in the case of lines in service prior to the March 15 implementation date. More frequent service was maintained on Line 604 on Venice Boulevard, where seven- to eight-minute headways existed prior to March 15. Twenty-minute headways were maintained on Sunset Boulevard Line 601, which has an extremely long portion of its route on surface streets, and on the Culver City Line 606, where headways of approximately one hour existed prior to the project.

Bi-directional peak-hour and midday service was operated on SMMBL Express Route 10, on the crosstown feeder Route 14, and on SCRTD Line 607. Bi-directional peak-hour service was operated on SCRTD Lines 601, 602, 603 and 605. Service in the peak direction only was operated on SCRTD Lines 604, 606 (off-peak direction service was operated in the evening peak only on this line), and on the Park-and-Ride Lots 708, 746 and 774. Hours of service, bus frequencies, and the number of trips operated on freeway-express lines over the length of the project are indicated in Appendix C (Table C2-5). Exhibit 6.5 charts the number of buses assigned to each Diamond Lane route throughout the project. The initiated changes were made primarily in response to changes in ridership levels. Service levels on the SMMBL feeder bus route along Bundy Drive and Centinela Avenue were set at 30-minute headways between 7:30 AM and 5:30 PM.

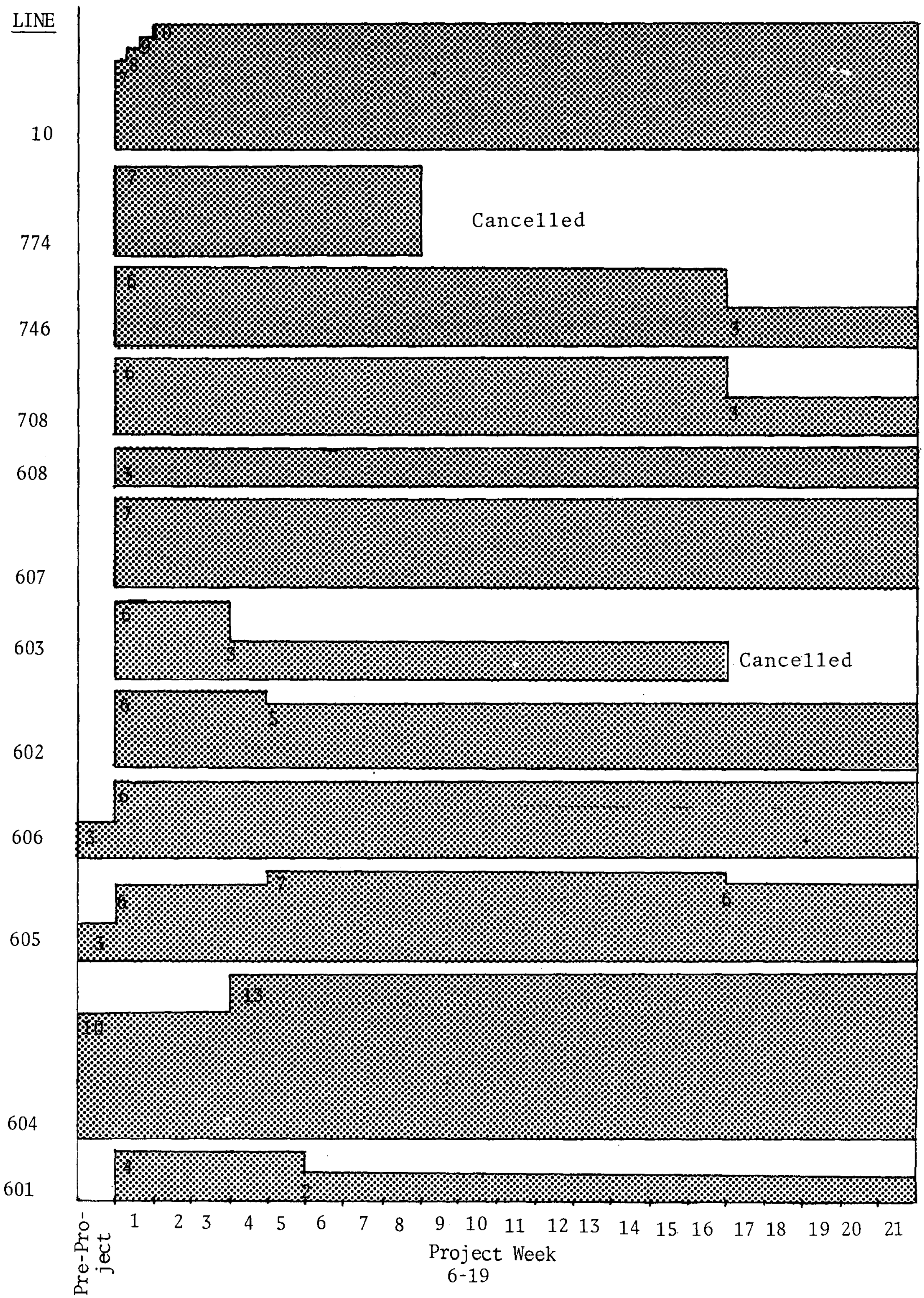
6.2.3 Schedule Reliability

One of the objectives of this preferential treatment experiment was to improve transit schedule reliability. Before evaluating the impact of the Diamond Lanes on schedule reliability, it is important to understand how the bus schedules are formulated for rush-hour commuter runs such as the Diamond Lane routes. These routes are typically designed to operate in a pick-up mode at the beginning of the run before entering the freeway and in a drop-off mode upon leaving the freeway. The Santa Monica Freeway is an express link connecting these two portions of the route.

For such routes, it is important not to leave a scheduled checkpoint early on the pick-up end in the residential areas for the morning trips and in the downtown district for afternoon rush hours. (Obviously, this could cause potential passengers to miss the bus). It is also undesirable to arrive extremely late at stops on the drop-off end of the route, causing patrons to be late for appointments. Thus, the published schedule times represent a delicate balance between these two extremes, providing sufficient "slack" time so that buses will never be late at drop-off stops except with a minor disruption.

Given this information on scheduling, one would expect to find that the probability of Diamond Lane buses being early should be greater at the drop-off end of the runs. This hypothesis seems to be verified by the data presented in Table 6.2 for SCRTD Diamond Lane routes. This table indicates that buses arrived early at pick-up stops only one-fourth of the time, with the average arrival time later than the scheduled time. At drop-off points, on the other hand, a greater percentage (69% on the A.M. and 57% in the P.M.) of the buses arrived early, with the mean on-time performance negative. Thus, by allowing a sufficient amount of slack in the schedule, the scheduler can directly influence on-time performance. This relationship suggests that schedule regularity would be a better measure than average on-time performance for peak-period commuter runs such as the Diamond Lane routes. One possible measure of schedule reliability is the coefficient of variation, defined as the standard

EXHIBIT 6.5: NUMBER OF BUSES ASSIGNED BY ROUTE



deviation of on-time performance divided by the mean ($\sigma/\bar{x}$). The mean on-time performance is computed by summing the schedule deviations (actual arrival time - scheduled arrival time) for all observations and dividing by the total number of observations. The standard deviation is computed in a similar manner to calculate the coefficient of variation. These statistical measures are tabulated in Table 6.2 for SCRTD Diamond Lane routes.

6.2.3.1 Alternative Definitions of Reliability - Based on the collected schedule information, four alternate definitions of transit reliability were postulated:

1. R_1 = (Actual Arrival Time) - (Scheduled Arrival Time)
2. $R_2 = |R_1|$
3. $R_3 = R_1^2$
4. $R_4 = \text{Max}\ (0, R_1)$

With the first definition, both positive and negative values are possible. Negative values indicate early arrivals and positive values measure lateness. This definition is adequate for lines with both pick-up and drop-off points, but inadequate if earliness is to be treated differently than lateness, as in the case of rush-hour commuter lines where one end of the run is primarily for picking up passengers and the other end is primarily for dropping them off. As mentioned above, in such cases it is desirable that buses arrive earlier than the scheduled time at the drop-off end of the line, but not at the pick-up end where potential passengers would miss the bus. The second definition of transit reliability is the absolute value of the first and, hence, measures schedule deviations. The third definition is the square of the first, and thus places greater weight on larger deviations. The fourth definition measures lateness, as negative values are not counted.

In the following analysis, the first definition was chosen to measure on-time performance for Diamond Lane buses. The reason for choosing this definition is that intuitively it is the easiest to understand and to communicate in a physical sense to non-statisticians. However, this choice made it necessary to compute on-time performance separately for pick-up and drop-off checkpoints. Since these are all essentially rush-hour commuter lines, earliness and lateness are valued differently over the checkpoints. The observations were also partitioned between morning and evening peak periods, since the pick-up and drop-off ends are reversed between the peak periods. This data classification scheme controls for the most important independent factors affecting on-time performance. Having done this, valid comparisons can be made concerning the impact of the preferential treatment on transit reliability using the first definition above.

TABLE 6.2

COMPARISON OF ON-TIME PERFORMANCE

BY OPERATING MODE FOR DIAMOND LANE BUSES

Peak Period Direction of Travel Checkpoint Location	Percent Early Buses	Mean On-Time Performance*	Standard Deviation σ	Coefficient of Variation $\sigma/\bar{x}$
A.M. Peak Period Inbound				
• Westside Pick-Up	23%	+0.949 min. (late)	8.414	8.87
• Downtown Drop-Off	69%	-1.876 min. (early)	4.991	-2.66
P.M. Peak Period Outbound				
• Downtown Pick-Up	24%	+3.863 min. (late)	6.783	1.76
• Westside Drop-Off	57%	-1.811 min. (early)	5.023	-2.77

(Based on data for all SCRTD Diamond Lane routes during the Diamond Lane period)

*Defined as: (Actual Arrival Time) - (Scheduled Arrival Time)

6.2.3.2 Effect of the Diamond Lane - An attempt was made to ascertain the effect of the Diamond Lanes on the selected measure of reliability. The following statistical hypothesis was formulated: Transit on-time performance did not improve when the Diamond Lanes were implemented. To test this hypothesis, transit on-time performance data was collected on weekdays during peak periods before and during Diamond Lane implementation for the following four subpopulations:

1. SCRTD Diamond Lane Buses

   o Lines 601, 604, 605 and 606

2. SCRTD Parallel Non-Freeway Buses (Surface Street Control Group)

   o Line 12

3. SCRTD Long Beach Freeway Buses (Freeway Control Group)

   o Lines 34 and 36

4. SMMBL Diamond Lane Buses

   o Line 10

The majority of this data was recorded for Diamond Lane bus routes at Venice Boulevard and Grand Avenue in downtown Los Angeles. This checkpoint is situated close to the freeway entrance and exit used by these buses. Data was also recorded by on-time checkers at the locations indicated in Table 6.3.

TABLE 6.3: CHECKPOINT LOCATIONS

Checkpoint Intersection	Lines
Sepulveda and Culver	606
Venice and La Cienega	604, 606
Venice and Sepulveda	604
Washington and La Brea	12
Venice and Grand (downtown)	601, 604, 605, 606
Seventh and Sante Fe	34, 36

In an effort to single out the impacts of the Diamond Lanes, the following variables were identified as possible independent variables or factors affecting on-time performance:

1. Schedule slack;
2. Bus route;
3. Period of day (i.e., AM peak hours, PM peak hours, off-peak hours);
4. Direction of travel (e.g., inbound/outbound);
5. Checkpoint location; and
6. Bus driver experience.

Any attempt to detect a relationship between on-time performance and the Diamond Lanes should control for these variables. If the relationship still persists after correcting for differences due to these variables, then significant changes can be attributed to the Diamond Lanes. To detect the relationship between on-time performance and the Diamond Lanes, comparisons were made between the Diamond Lane routes before and during Lane operation and between the Diamond Lane routes and the control groups.

6.2.3.3 Comparisons Before and During Diamond Lane Operation - Several t-tests were performed to test the hypothesis that the Diamond Lanes affected on-time performance. The group of these tests consisted of all SCRTD Diamond Lane routes operating before implementation of the project. Specifically, these are Line Numbers 601, 604, 605, and 606. The results of the t-tests are presented in Table 6.4, and indicate that the Lane allowed bus drivers to arrive significantly earlier in the P.M. peak at stops after leaving the Santa Monica Freeway. However, no statistically significant changes occurred in the average on-time performance at "pick-up stops" made before entering the Freeway. This supports the hypothesis that the Diamond Lanes allowed the buses to drop Westside commuters at their destinations earlier than scheduled. Since no schedule changes were made in the timing of existing runs with the introduction of the Diamond Lanes, this difference is due to a reduction in travel time on the Freeway.

The Diamond Lanes also caused some changes in the variability of on-time performance as measured by the standard deviation. Table 6.4 shows a significant drop in variability for P.M. peak period outbound buses arriving in West Los Angeles. This indicates that deviations from the scheduled times varied less during the Diamond Lane. There was little change for the A.M. peak period inbound buses arriving in downtown Los Angeles. However, the variability increased significantly for these A.M. inbound buses before they entered the Diamond Lanes in West Los Angeles. Some of this variation may be attributed to the new drivers and also to the increased number of stops caused by higher ridership.

The subjective opinion of the bus drivers also provides useful input to evaluate this issue. In a survey conducted on August 5, 1976, bus drivers were asked whether or not the Diamond Lanes helped their on-time performance. Ninety-seven percent of the drivers responding indicated that the Diamond Lanes did improve their schedule performance. Since the survey was not statistically controlled and the response rate was relatively low, the results may not represent a true measure of the drivers' opinions. Nevertheless, in the case of on-time performance, the response was almost unanimous that the Diamond Lanes had improved on-time performance.

TABLE 6. 4

COMPARISONS BEFORE AND DURING DIAMOND LANE;

AVERAGE ON-TIME PERFORMANCE OF SCRTD DIAMOND LANE ROUTES

A.M. PEAK PERIOD/INBOUND/WEST LOS ANGELES

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
Before ◇ Lanes	21%	65%	+1.810	3.195	1.77
During ◇ Lanes	23%	65%	+0.949	8.414	8.87

t TEST: No significant difference in mean on-time performance at the α =.05 level.

A.M. PEAK PERIOD/INBOUND/DOWNTOWN LOS ANGELES

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
Before ◇ Lanes	61%	32%	-0.593	4.792	-8.08
During ◇ Lanes	69%	23%	-1.876	4.991	-2.66

t TEST: No significant difference in mean on-time performance at the α =.05 level.

P.M. PEAK PERIOD/OUTBOUND/DOWNTOWN LOS ANGELES

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
Before ◇ Lanes	24%	69%	3.316	6.242	1.88
During ◇ Lanes	24%	69%	3.863	6.783	1.76

t TEST: No significant difference in mean on-time performance at the α =.05 level.

P.M. PEAK PERIOD/OUTBOUND/WEST LOS ANGELES

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
Before ◇ Lanes	40%	65%	.395	8.739	22.12
During ◇ Lanes	57%	35%	-1.811	5.023	2.77

t TEST: The mean on-time performance is significantly earlier during Diamond Lane operation at the α =.05 level.

6.2.3.4 Comparison With Control Groups - Two groups of SCRTD buses were identified as control groups for purposes of comparing their average schedule reliability with the Diamond Lane buses. The first group was composed of two SCRTD lines, 34 and 36, running on the Long Beach Freeway without preferential treatment. The second group contained one surface street route, #12, running parallel to the Santa Monica Freeway. This group was chosen to compare the on-time performance of the freeway express line with that of a conventional fixed-route surface street line. The results of these comparisons are tabulated in Table 6.5. In all four cases tested, the differences in on-time performance between the Diamond Lane routes and the control groups were significant.

For A.M. peak period inbound buses arriving downtown, the Diamond Lane routes arrived significantly earlier on the average at these drop-off points than the Long Beach Freeway routes. However, the variability was significantly higher on the Diamond Lane routes. For P.M. peak period outbound buses leaving downtown, the Diamond Lane routes arrived significantly later on the average at these pick-up points than the Long Beach Freeway routes. The variability was also significantly higher. These differences are independent of the Diamond Lane, since the pick-up checkpoints were stopped at before entering the Santa Monica Freeway, and it is better to arrive late than early at these points. Comparing surface street buses with Diamond Lane routes shows that the P.M. peak period outbound Diamond Lane buses arrived significantly earlier in West Los Angeles. The variability is also higher at these drop-off checkpoints, indicating greater unpredictability with the Diamond Lane routes.

As shown in the table, the variability in on-time performance as measured by the standard deviation is much lower for the control groups. To a degree, this indicates greater regularity for the control groups. Part of this difference may be attributed to differences in bus driver experience between the two groups. Lines 34 and 36, which were designated as control routes, were driven by drivers from SCRTD generating divisions 6 and 12. These drivers were considerably more experienced than those in divisions 4 and 5, who worked the Diamond Lane lines. Presumably, the drivers' on-time performance improved with experience, so this difference presented a serious problem of comparability for the two groups.

For this reason and because of differences in schedule slack, on-time data collected after the Diamond Lanes were terminated will provide a better basis for separating the impacts of the Diamond Lanes on schedule reliability.

6.2.3.5 Reliability Over Time - The average on-time performance for SMMBL Diamond Lane buses is plotted over time in Exhibit 6.6. This graph is based on data recorded during the A.M. peak period at Venice Boulevard and Grand Avenue in downtown Los Angeles. Since SMMBL did not operate this line before the Diamond Lane project, no before and during comparison can be made. However, a salient point to be noted from this plot is the learning curve effect during the first several weeks of the project. During this

TABLE 6.5

SCRTD DIAMOND LANE BUSES AVERAGE ON-TIME PERFORMANCE*

COMPARISONS WITH CONTROL GROUPS

A.M. PEAK PERIOD/INBOUND/DOWNTOWN

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
◇ Lane Routes	69%	23%	-1.876	4.991	-2.66
Long Beach Freeway Routes	40%	49%	+1.548	2.729	+1.76

t TEST: Difference in on-time performance is significant. (α = .05)

A.M. PEAK PERIOD/INBOUND/WESTSIDE

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
◇ Lane Routes	24%	69%	3,316	6.242	1.88
Long Beach Freeway Routes	22%	46%	+0.541	2.350	4.34

t TEST: The difference is significant. (α = .05)

P.M. PEAK PERIOD/OUTBOUND/DOWNTOWN

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
◇ Lane Routes	23%	65%	+0.949	8.414	-8.87
Surface Street Routes	12%	61%	1.255	3.427	2.73

t TEST: The difference is significant. (α = .05)

P.M. PEAK PERIOD/OUTBOUND/WESTSIDE

	Early	Late	Mean $\bar{x}$	Std Dev σ	Coeff Var $\sigma/\bar{x}$
◇ Lane Routes	57%	35%	-1.811	5.023	2.77
Surface Street Routes	26%	59%	+1.599	3.922	2.45

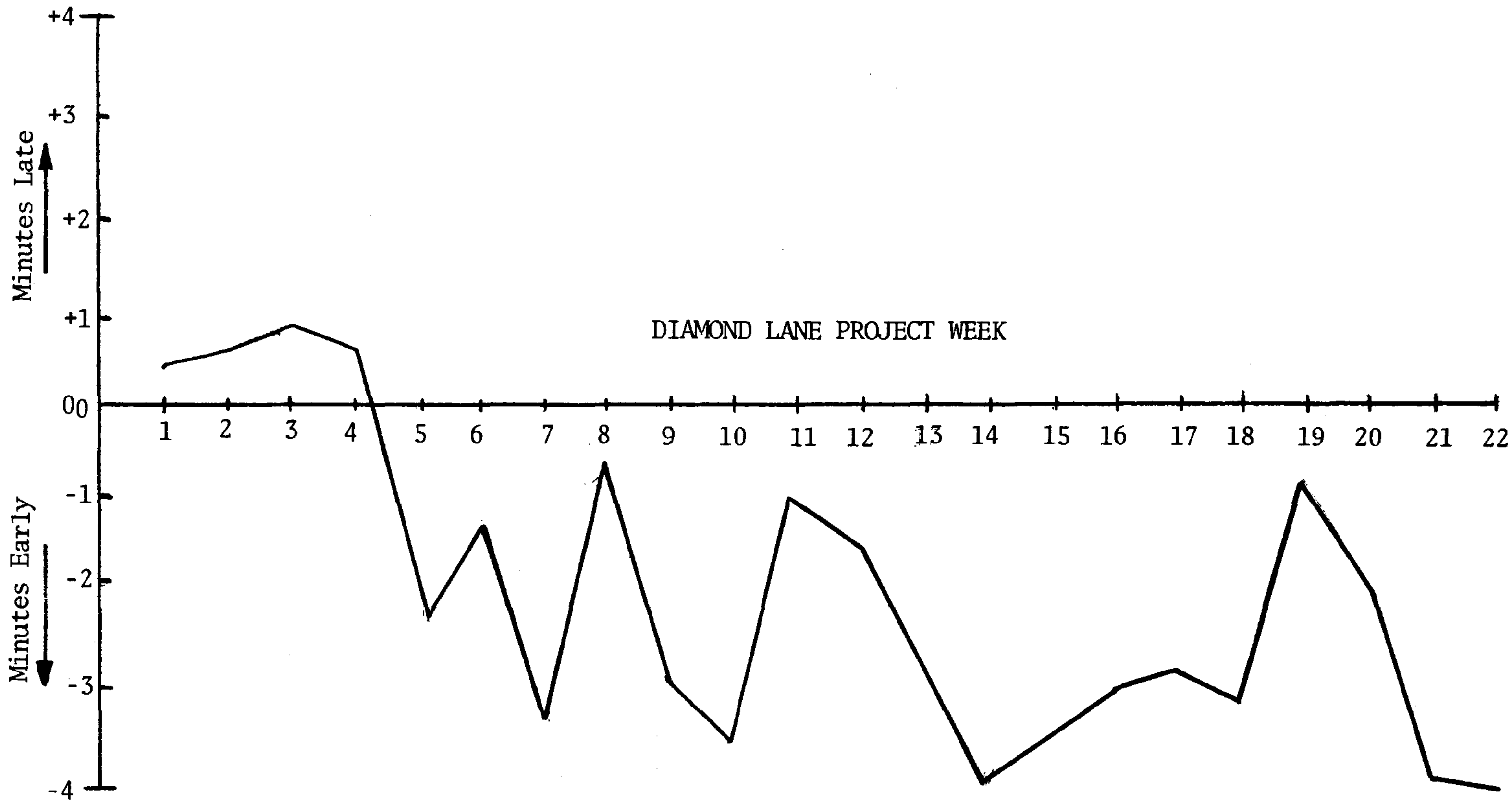
t TEST: The difference is significant. (α= .05)

* Defined as: $\begin{pmatrix}\text{Actual}\\\text{Arrival}\\\text{Time}\end{pmatrix} - \begin{pmatrix}\text{Scheduled}\\\text{Arrival}\\\text{Time}\end{pmatrix}$

No data was available for the Long Beach Freeway routes in West Los Angeles inbound during the A.M. and outbound during the P.M. Data was not collected for surface street routes of downtown checkpoints.

EXHIBIT 6.6

AVERAGE ON-TIME PERFORMANCE FOR SMMBL DIAMOND LANE BUSES*



*A.M. peak period inbound only; recorded at Venice Boulevard and Grand Avenue in downtown Los Angeles.

initial period, buses arrived downtown slightly late on the average. Part of this is probably due to greater congestion during the implementation period and to unfamiliarity of the drivers with the new routes and schedules. Overall, SMMBL buses inbound during the A.M. peak period averaged 1.80 minutes early at the downtown checkpoint. It should be pointed out that large variation in the plot is not significant from a reliability standpoint; that is, the actual range of the variation is only two minutes, although it appears relatively high on the graph.

6.2.3.6 Effect of Diamond Lane on Bus Freeway Travel - An interesting aspect of transit reliability is the implicit travel time saving on the Freeway for transit riders brought about by the Diamond Lane. This time saving can be inferred from the average on-time performance of Diamond Lane buses just before accessing the Freeway and immediately after exiting. SCRTD Route 604 was chosen as a basis for this comparison, since more reliability data were recorded before the project began for this line than any other. The results of this analysis for the morning rush-hours reveal a 2.09-minute Freeway travel time saving during the Diamond Lane hours of operation. This saving, achieved over an eight-mile segment of the Santa Monica Freeway, represents a relatively small proportion of the 43.2-minute door-to-door travel time experienced by riders of the 604 route following Diamond Lane implementation. This two-minute savings also brought about a significant improvement in mean on-time performance for both the morning and evening commute trips. However, it appears that the variability of on-time performance increased as a result of the Diamond Lanes.

6.3 BUS PATRONAGE

6.3.1 Daily Ridership

Average daily peak period bus ridership for all project buses is plotted over time in Exhibit 6.7 and tabulated in Table 6.6. As shown, the combined ridership rose from an average of 2,344 riders per day during the first week of the project to a maximum of 3,911 per day during the 16th week, and then tapered off gradually to 3,565 per day during the final week of the project. Over the entire project period, the mean ridership was 3,352 riders per day, with an average occupancy rate of 19.3 riders per trip.

Note that ridership dropped significantly during the fifth week of project operation. This drop can be attributed to the Easter holiday, when many commuters were off work. The incidence of other holidays is indicated below the horizontal scale of the graph. Ridership on SCRTD lines dropped slightly during each holiday week and also following the court decision to terminate the project in the 21st week.

As explained in Section 6.1.1, SCRTD started four of their Santa Monica Freeway routes prior to the implementation of the Diamond Lanes. The combined ridership on these routes is plotted

EXHIBIT 6.7: AVERAGE DAILY PEAK-PERIOD BUS RIDERSHIP ON ALL SANTA MONICA FREEWAY PROJECT ROUTES IN THE PEAK DIRECTION OF TRAVEL ONLY

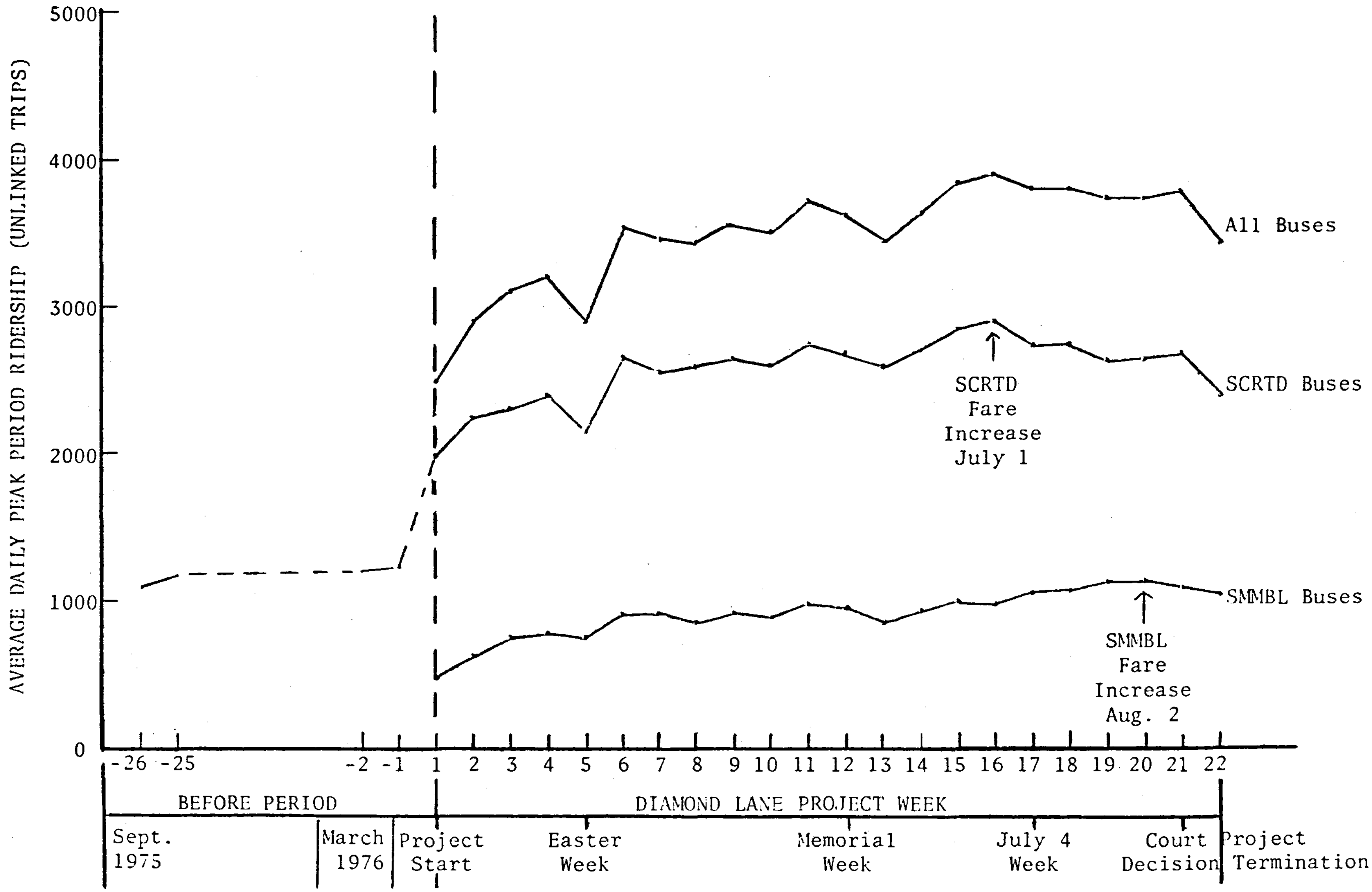


TABLE 6.6

AVERAGE DAILY PEAK PERIOD BUS RIDERSHIP

FOR ALL SANTA MONICA FREEWAY ROUTES

DIAMOND LANE PROJECT WEEK	SCRTD ROUTES		SMMBL ROUTES		ALL ROUTES	
	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip
BEFORE WEEKS						
-26	1,092	30.3	No Service Prior to March 15, 1976		1,092	30.3
-25	1,171	32.5			1,171	32.5
-2	1,201	32.5			1,201	32.5
-1	1,235	32.5			1,235	32.5
SUMMARY STATISTICS FOR THE PRE-PROJECT PERIOD						
Mean	1,171	31.9	--	--	1,171	31.9
Std Deviation	62.10	1.14	--	--	62.10	1.14
Coeff Variation	.05	.04	--	--	.05	.04
Minimum	1,088	30.3	--	--	1,088	30.3
Maximum	1,235	33.15	--	--	1,235	33.15
DURING PROJECT						
1	1,999	14.6	496	29.4	2,495	16.2
2	2,253	16.3	656	34.0	2,909	18.5
3	2,318	16.7	778	37.0	3,096	19.3
4	2,422	18.4	777	37.0	3,199	20.9
5	2,160	14.6	753	35.9	2,913	17.2
6	2,642	17.6	903	43.0	3,545	20.7
7	2,578	17.2	911	43.4	3,489	20.3
8	2,579	17.3	858	40.9	3,437	20.7
9	2,653	19.8	924	44.0	3,577	23.1
10	2,635	19.7	888	42.3	3,523	22.9
11	2,765	20.6	962	45.8	3,727	23.9
12	2,692	20.1	945	45.0	3,637	23.5
13	2,601	19.6	829	39.5	3,430	22.3
14	2,714	20.4	935	44.5	3,649	23.7
15	2,851	21.4	996	47.4	3,847	25.0
16	2,892	22.1	987	47.0	3,879	25.5
17	2,748	24.8	1,077	51.3	3,825	29.0
18	2,736	24.6	1,060	48.2	3,796	28.5
19	2,633	23.7	1,132	51.5	3,765	28.3
20	2,658	23.9	1,109	50.4	3,767	28.3
21	2,718	24.5	1,075	43.0	3,793	27.9
22	2,395	21.6	1,055	42.2	3,450	25.4
SUMMARY STATISTICS FOR THE 22-WEEK PROJECT PERIOD						
Mean	2,494	19.2	870	41.1	3,364	22.2
Std Deviation	305.78	3.59	187.47	6.71	466.15	4.23
Coeff Variation	.12	.19	.22	.16	.14	.19
Maximum	3,008	25.4	1,151	53.3	3,978	29.9
Minimum	1,509	10.2	367	24.3	2,019	11.9

in Exhibit 6.7 for the last two weeks of September 1975 and for the first two weeks of March 1976. The average daily peak period ridership during this before period was 1,171 passengers per day, with an average of 33.15 passengers per trip. This average occupancy dropped significantly, to 19.3 riders per day during the project, partially because of the large increase in the number of scheduled trips. The total number of scheduled trips per day before was 38, as compared to 153 during the first week of project operation.

The total daily project bus ridership plotted in Exhibit 6.7 is also plotted separately for SCRTD and SMMBL routes because of inherent differences in their operation. An interesting point to note about this dichotomy is that while the growth patterns are essentially the same for both companies, SMMBL--the smaller company--carried 26% of the combined average daily ridership on only 15% of the total trips. Another way to view this is the difference in occupancy rates for the two companies. SCRTD's average occupancy rate during the project was 19.3 riders per trip with a minimum of 12.75 and a maximum of 24.8. During the same period, SMMBL averaged 41.1 riders per trip with a high of 53.3 and a low of 24.3. Some of the reasons for the significant differences between SCRTD and SMMBL patronage are discussed in subsequent subsections.

For SCRTD, this average occupancy rate of 19.2 riders per trip was well below normal, and reflected a policy decision to provide as much service as possible on Diamond Lane lines early in the project. As a result, many lines were undersubscribed. This was a primary cause of concern for SCRTD planners, and forced them to discontinue trips and cancel unproductive routes throughout the length of the project. To understand the rationale for these decisions, it is necessary to examine average ridership and occupancy rates for the various SCRTD routes separately. To do this, it is convenient to divide the routes into the following natural groups:

<u>Old Routes</u>: SCRTD Santa Monica Freeway routes operating before March 15, 1976 (Lines 601, 604, 605 and 606);

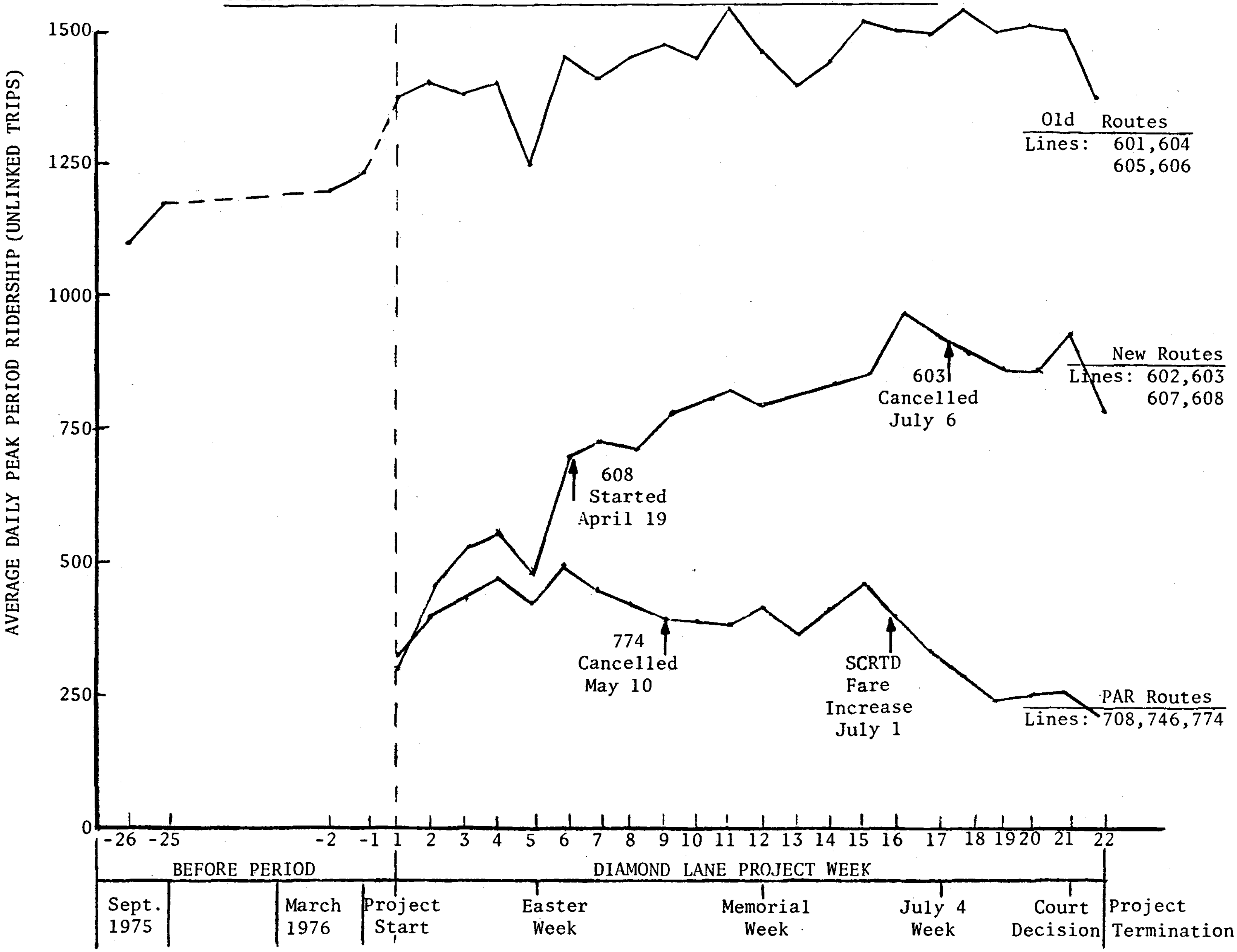
<u>New Routes</u>: SCRTD Santa Monica Freeway routes started on or after March 15, 1976 (Lines 602, 603, 607 and 608)

<u>PAR Routes</u>: SCRTD Santa Monica Freeway Park and Ride Routes (Lines 708, 746 and 774)

The average daily ridership on each of these groups is plotted in Exhibit 6.8. Average daily ridership on old routes--those in operation on the Freeway before the Diamond Lanes were implemented--increased from 1,171 per day before the project to 1,428 during the project (a 22% increase). A t-test shows that this increase of 257 riders per day was statistically significant. At the same time, however, the average occupancy rate on these lines dropped significantly, from an average of 32.5 riders per trip before to

EXHIBIT 6.8

AVERAGE DAILY PEAK PERIOD BUS RIDERSHIP FOR DIFFERENT GROUPS OF SCRTD SANTA MONICA FREEWAY ROUTES IN THE PEAK DIRECTION OF TRAVEL ONLY



24.6 riders per trip. This is due to an increase in the number of scheduled trips from 38 to 53 during during peak periods in the peak direction on old routes.

Ridership on new SCRTD routes averaged 687 per day with 18.8 riders per trip over the length of the project. However, this average is misleading, since ridership on these routes exceeded 750 per day every week after the seventh week, when the new 608 line was introduced. Hence, after a slow start, ridership began to grow on SCRTD's new routes.

Peak-period ridership on SCRTD's three Park-and-Ride lines averaged 394 per day and 11 passengers per trip. Patronage was lowest for the Century City lot, which was discontinued on May 10 after seven weeks of operation. Route 774, which served this route, carried only 80 passengers per day on 16 trips. Line 746, serving the Fox Hills lot, averaged 142 riders per day with 9.7 riders per trip. Line 708 was the most productive Park-and-Ride route, carrying an average of 201 riders per day with an average load of 14.6 per trip.

Not only was Park-and-Ride patronage well below that anticipated throughout the project, but patronage on each of the three lines declined as the project progressed. The mid-project fare increase appeared to contribute somewhat to this decline. Another possible reason for this decline is disenchantment on the part of early riders who found that they did not like the service and either reverted to their previous mode or switched to a different bus route which allowed them to make the same trip. Apparently, some Park-and-Ride patrons found they could make the same bus trip more expeditiously on another route. As a result of the declining patronage levels and the termination of the Diamond Lane project, SCRTD cancelled all Westside Park-and-Ride services effective September 1, 1976.

Table 6.7 indicates the usage of each of the Park-and-Ride lots over time, with both the average number of cars parked and the average number of daily passengers. While the Santa Monica lot was the most utilized, its highest usage was only 53% of capacity.

Exhibits 6.9, 6.10 and 6.11 plot ridership statistics over time on each SCRTD route. Daily ridership statistics have been tabulated individually for each project route and for each group of routes. These graphs and tables may be found in Appendix B.

6.3.2 Trip Characteristics

Trip characteristics, along with trip histories and rider characteristics which follow, were obtained from two on-board surveys conducted on the Diamond Lane buses of SCRTD and SMMBL. The SCRTD survey occurred on Wednesday, June 30, just prior to an announced fare increase. Estimated total SCRTD ridership for the survey day was 2,900 passengers; the ridership surveyed with completed forms totaled 1,104 or 38%. The SMMBL survey was taken on Thursday,

TABLE 6.7

PARK AND RIDE LOTS - SANTA MONICA FREEWAY

DIAMOND LANE PROJECT, 1976

Lot:	Santa Monica	Fox Hills	Century City*
Bus Line:	#708	#746	#774
Average Daily Cars Parked:			
April	117	63	13/32
May	92	71	N/A
June	101	78	15
July**	90	62	18
August	60	42	17
Auto Capacity:	220	200	300
Average Daily Passengers:			
April	254	151	36/69
May	232	158	N/A
June	225	170	38
July**	200	188	43
August	146	113	39

Note: All park and ride service was discontinued on 9/1/76.
Source: SCRTD data.

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*Century City service discontinued 5/10/76.

**Service cut back 40% on 7/6/76.

EXHIBIT 6.9

AVERAGE DAILY PEAK PERIOD BUS RIDERSHIP

ON OLD SCRTD SANTA MONICA FREEWAY ROUTES

IN THE PEAK DIRECTION OF TRAVEL ONLY

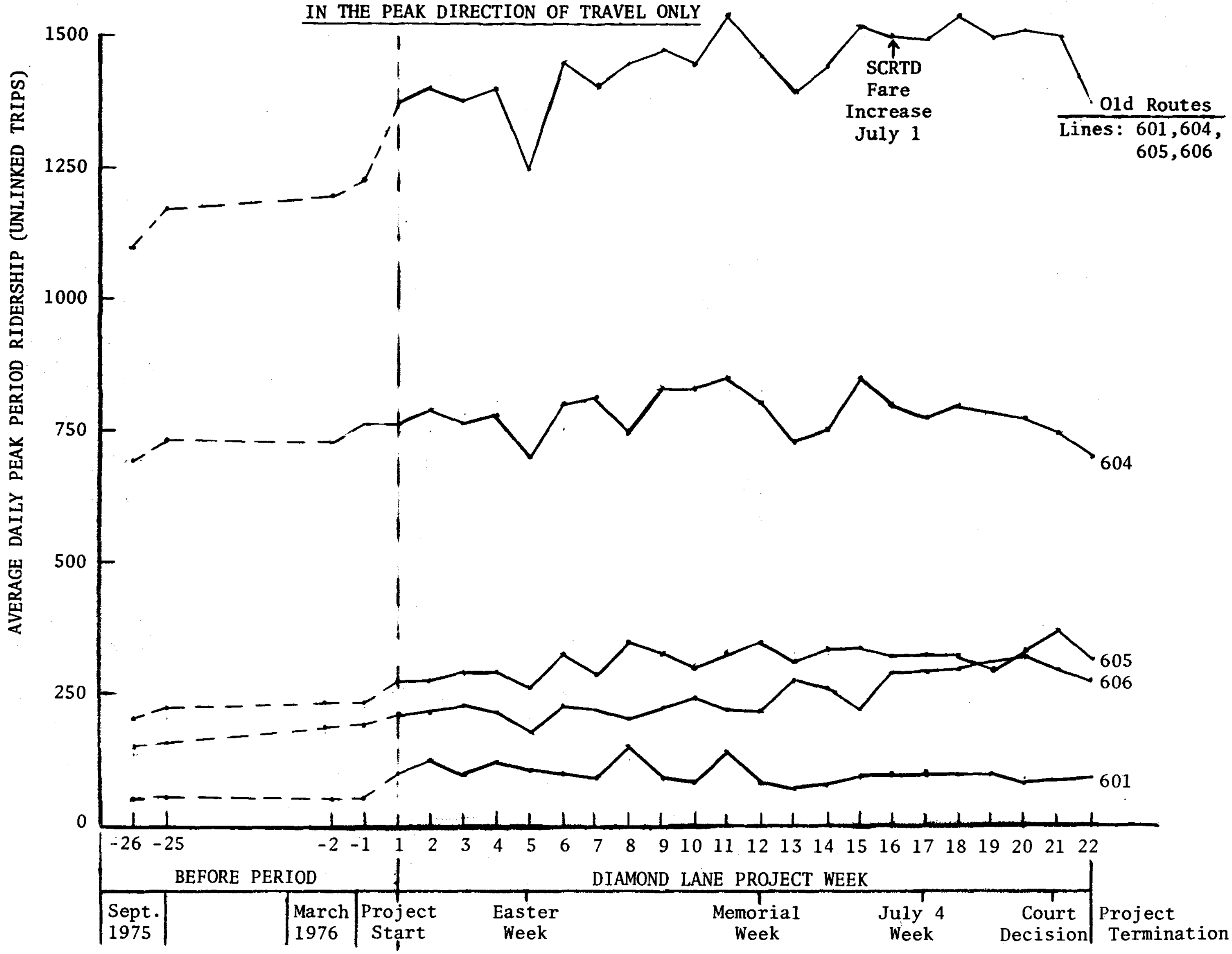


EXHIBIT 6. 10

AVERAGE DAILY PEAK PERIOD BUS RIDERSHIP

ON NEW SCRTD SANTA MONICA FREEWAY ROUTES

IN THE PEAK DIRECTION OF TRAVEL ONLY

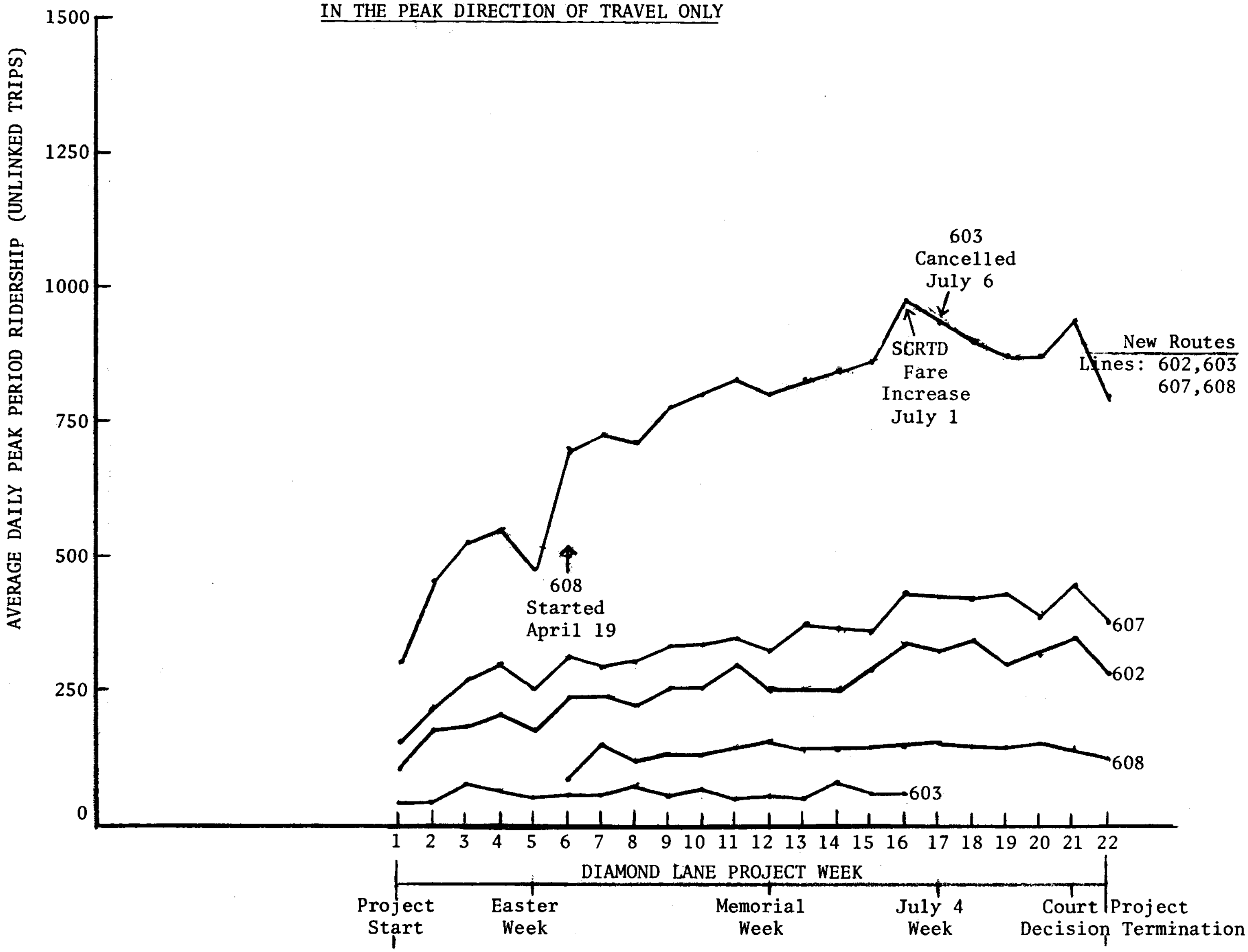
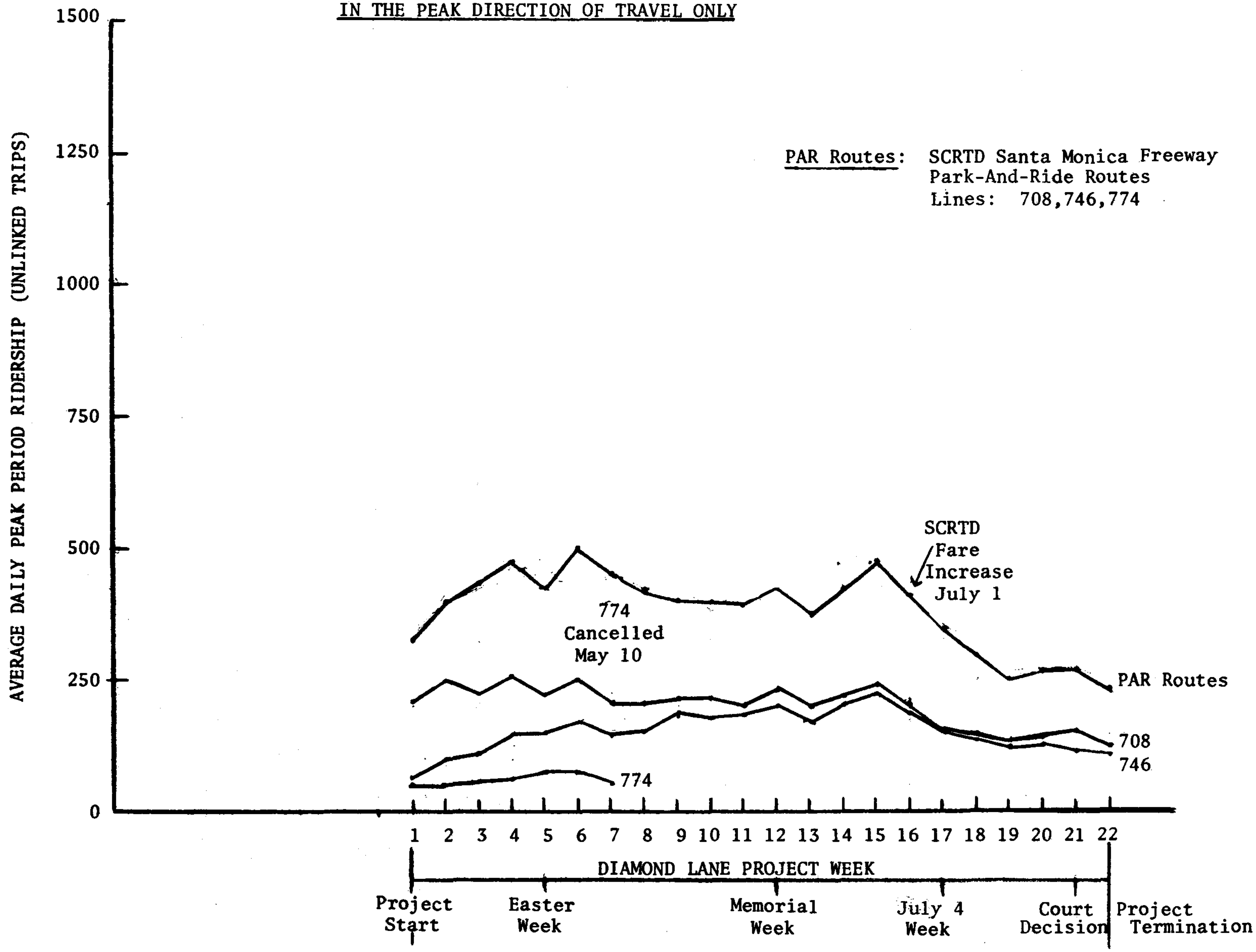


EXHIBIT 6. 11

AVERAGE DAILY PEAK PERIOD BUS RIDERSHIP

ON SCRTD SANTA MONICA FREEWAY PARK-AND-RIDE ROUTES

IN THE PEAK DIRECTION OF TRAVEL ONLY



August 12, two weeks after an SMMBL fare increase and three days after Judge Byrne's court decision to terminate the project on August 13. Total SMMBL ridership on the day of the survey was 998; the completed survey forms totaled 348 or 35% of the total number of passengers. Most of the results which follow are combined SCRTD and SMMBL results, except when there are differences of significance. Details of the survey design and the survey forms may be found in Appendix A.

6.3.2.1 Trip Purpose - Riders were asked the main purpose of the bus trip they were making. Not unexpectedly for bus service to the CBD during peak hour commute time in the summer season, 95.8% of the trips were work trips. Riders traveling to jury duty may be taking advantage of "front door" service provided as the bus CBD distribution route passes through the courthouse area. The answers were distributed as follows:

Main Purpose	Number	Percentage
Work	1,391	95.8
Jury Duty	32	2.2
School	16	1.1
Social-Recreational	5	.3
Medical-Dental	3	.2
Shopping	2	.1
Other	3	.2
Total	1,452	

6.3.2.2 Trip Frequency - When asked how often they rode the bus line they were on, 77% of the riders stated they were regular riders. Viewed separately, SMMBL regular passengers comprised 85% of the ridership.

RIDERSHIP FREQUENCY AMONG BUS USERS SURVEYED

Frequency of Bus Use	Total No.	Total %	SCRTD No.	SCRTD %	SMMBL No.	SMMBL %
Regular	1115	76.9	818	74.2	297	85.3
3-4 Days/Week	234	16.1	196	17.8	38	10.2
1-2 Days/Week	52	3.6	41	3.7	11	3.2
Very Seldom	49	3.4	47	4.3	2	.6
	1450	100.0	1102	100.0	348	100.0

6.5.2.3 Access to Bus - Riders were asked how they traveled to the bus stop to begin their trip. Ninety-nine percent of the riders began their trip from home. The majority walked (58%) and approximately one-quarter drove (26.7%).. Eighty percent of the walkers traveled for three blocks or less to reach the bus, although SMMBL walkers traveled slightly further by foot than SCRTD riders.

MEANS OF TRAVELING TO BUS STOP

Mode	Total		SCRTD		SMMBL	
	No.	%	No.	%	No.	%
Walked	840	57.8	629	56.9	211	60.9
Driven	114	7.8	84	7.6	30	8.6
Transferred	109	7.5	78	7.1	31	8.9
Drove	387	26.7	312	28.3	75	21.6
Other	2	.2	1	.1	1	.3
n =	1452	100.0	1104	100.0	348	100.0

DISTANCE WALKED TO BUS STOP

*Walkers	Total			SCRTD			SMMBL		
	No.	%	Cum. %	No.	%	Cum. %	No.	%	Cum. %
≤ 1 Block	439	52.3		395	62.8		44	20.9	
2 Blocks	140	16.7	68.9	79	12.6	75.4	61	28.9	49.8
3 Blocks	97	11.5	80.5	61	9.7	85.1	36	17.1	66.8
4 Blocks	63	7.5	88.0	33	5.2	90.3	30	14.2	81.0
5 Blocks	39	4.6	92.6	23	3.7	94.0	16	7.6	88.6
6-10 Blocks	59	7.1	99.6	38	6.0	100.0	21	9.9	98.6
11-13 Blocks	3	.3	100.0	--	-	--	3	1.5	100.0

Those who drove to the bus stop comprised 28% of all SCRTD riders. Two factors accounted for most of the 312 driver-riders: The two Park-and-Ride lots had 201 riders surveyed, and the existence of "spontaneous" Park-and-Ride locations along various routes which people found convenient and found available space for parking. Two of these locations were along the 602 line at Manning and Woodbine and at La Cienega and Venice serving the 604, 606 and 607 lines.

The five locations the 75 SMMBL driver-riders found it convenient to drive to are listed below:

Location	Number of Driver-Riders	Comment
Bundy and Pico	19	Last stop before freeway
Santa Monica Blvd. and Bundy	16	
Bundy and Idaho	10	Within 3 blocks of one another
Santa Monica Blvd. and Wellesley	6	
Santa Monica Blvd. and 10th Street	5	Downtown area
Other	19	Scattered locations

In all, the number of driver-riders patronizing SMMBL and SCRTD feeder express routes almost equalled the number of driver-riders patronizing the three designated Park-and-Ride routes.

6.3.2.4 Exit From Bus - When the surveyed riders left the bus, most of them (88%) walked to their destination. For 85.6% of those walking, their destination was within two blocks of the bus stop (see table below). Only 11.5% transferred to another bus, and most (84%) of these transferees were SCRTD riders.

DISTANCE WALKED UPON LEAVING BUS			
WALKERS	T O T A L		
	Number	Percentage	Cum. %
≤ 1 Block	925	72.7	
2 Blocks	165	13.0	85.6
3 Blocks	99	7.8	93.4
4 Blocks	35	2.7	96.2
5-10 Blocks	49	3.9	100.0

6.3.2.5 Return Trip Mode - For their return trip, 94% of the riders used bus transportation: 86% on the same bus line and 8% on a different bus. Over 96% of the SMMBL riders returned on the same bus, which is Santa Monica's only Diamond Lane line serving its downtown area.

Return Mode	Total		SCRTD		SMMBL	
	No.	%	No.	%	No.	%
Same bus route	1242	86.1	907	82.8	335	96.6
Another bus	118	8.2	112	10.2	6	1.7
Carpool	39	2.7	34	3.1	5	1.4
Other	44	3.0	43	3.9	1	.3
	1443	100.0	1096	100.0	347	100.0

6.3.3 Trip Histories

Riders were asked how they made their trip before the Diamond Lanes were operating. The table below shows the distribution of riders' prior mode:

Mode Before Lanes	Total		SCRTD		SMMBL	
	No.	%	No.	%	No.	%
Drove alone	560	38.9	385	35.2	175	50.5
Carpooled	123	8.5	82	7.5	41	11.8
Rode bus	518	35.9	461	42.1	57	16.4
Didn't make trip	236	16.4	163	14.9	73	21.0
Other	4	.3	3	.3	1	.3
	1441	100.0	1094	100.0	347	100.0

Before the Diamond Lanes, 560 people (39%) surveyed drove alone for the same trip they were now taking on the bus. If this figure is factored up to represent the same share of the estimated total ridership, it would mean about 700 former drivers changed to riding the bus. Thirty-six percent of the riders surveyed were bus riders prior to Diamond Lane implementation. Most of those riders used SCRTD lines, since SMMBL did not have express service to downtown Los Angeles before the project. The 57 SMMBL riders who did not change mode did change buses, mostly from SCRTD Lines 83 (a non-freeway route along Wilshire Boulevard) and 604 (the Venice Boulevard Diamond Lane route). Of the 641 SCRTD bus riders who said they rode a bus before the Diamond Lanes were in operation, slightly more than half rode one of the four routes converted to Diamond Lane service.

Another 23 percent switched from SCRTD Route 51, which was rerouted away from the airport midway through the demonstration. The remaining bus riders shifting from other routes defected from a variety of SCRTD routes, including Route 83 along Wilshire Boulevard.

Each bus rider was asked when he began riding the bus on which the survey was conducted. Roughly 50 percent of those surveyed had begun riding the bus by the end of March 1976. That is, half the bus riders began either before the Diamond Lane project or during the first two weeks of project implementation. Table 6.8 lists ridership starting dates as a function of the rider's previous mode of travel. This table shows that nearly seventy percent of those surveyed who had ridden buses prior to the Diamond Lane project switched to Diamond Lane buses before March 31. Although the early switching of bus riders to Diamond Lane routes is hardly surprising, it serves as a counterpoint to the complementary observation that, as the project progressed beyond the opening weeks, each new rider was more and more likely to have left an automobile at home than to have switched from another bus route.

TABLE 6.8

BREAKDOWN OF BUS RIDERS BEGINNING BEFORE AND AFTER MARCH 31

DATE RIDER BEGAN USING DIAMOND LANE BUS						
Mode Before ◇ Lanes	Began Before 3/31/76		Began After 3/31/76		Total	
	Number	Percent	Number	Percent	Number	% of All Modes
Drove Alone	282	50.5	276	49.5	558	39.0
Carpooled	60	49.2	62	50.8	122	8.5
Rode Bus	359	69.6	157	30.4	516	36.1
Didn't Make Trip	18	7.7	216	92.3	234	16.4
	719	50.3	711	49.7	1430	100.0

When asked how they first obtained the information necessary to use the Diamond Lane buses, riders responded with a variety of answers, generally giving more than one source. Of seven specific choices in the questionnaire, the most frequent sources cited by riders were friends or co-workers (29% of all sources mentioned) and phone calls to the bus company (28%). Downtown displays (12%) and news stories (11%) were also mentioned, followed in order of frequency by newspaper ads (6%, on-ramp handouts (4%), seeing the bus on the streets (4%), and asking bus drivers (3%). A variety of other sources made up an additional 4% of the information sources cited.

6.3.4 Rider Characteristics

6.3.4.1 Attitudes - When asked if they felt that non-carpoolers violating the Diamond Lane rule was a problem, 82.5% of those responding did consider it a problem. By way of contrast, only 65% of the automobile drivers surveyed considered it a problem.

Problem of Non-Carpoolers Violating ◊ Lane Rule is:	TOTAL No.	TOTAL %
Serious	455	33.3
Minor	671	49.2
No Problem	169	12.4
Irrelevant	17	1.2
Undecided	7	.5
No Comment	41	3.0
Other	5	.4
Total	1365	100.0

About half of those who considered violations a problem had previously traveled in cars; another 34% were previous bus riders. There were no differences in the attitude responses between the sexes, age group, occupation, or level of income.

When asked how they felt about the on-ramp bypass lanes for buses and carpools, 92% of the riders were in favor of such lanes.

On-Ramp Bypass Lanes are:	TOTAL No.	TOTAL %
Of great benefit	821	59.1
Beneficial	459	33.0
Of no benefit	51	3.7
Detrimental	59	4.2
Total	1390	100.0

Of those in favor of the bypass lanes, 63% formerly drove alone in their car. No significant differences were found in rider characteristics by age, sex, occupation, or income.

Overall, Diamond Lane bus service was considered satisfactory by 94.5% of the riders. All of the SMMBL ridership considered their service satisfactory. Again no differences in rider characteristics were found.

Opinion of Bus Service	Total		SCRTD	SMMBL
	No.	%	%	%
Very satisfied	1063	75.0	70.9	87.9
Somewhat satisfied	277	19.5	21.9	12.1
Not too satisfied	41	2.9	3.8	--
Dissatisfied	36	2.5	3.4	--
	n=1417		n=1071	n=346

Those riders who had switched from driving to taking the bus were asked the reasons for the change. Eight different possibilities were listed, and most respondents gave more than one answer. The array of reasons given are shown in the following table. The most frequent responses were freeway congestion, time to relax on the bus, and concern with saving energy and reducing pollution.

REASONS FOR CHANGING FROM DRIVING TO BUS RIDING

Reason	Number of Times Mentioned	Percentage
Gives time to relax	596	23
Freeway congestion	545	21
Saves energy and reduces pollution	458	17
Dislike driving	376	14
Saves time	292	11
Cheaper*	160	6
Frees car for another person	86	3
Carpool broke up	50	2
Other*	77	3
Total Multiple Responses	2637	100

*Indicates reason was not specifically stated in questionnaire.

Each passenger surveyed was asked for additional comments or suggestions for service improvements. A total of 1,173 such comments and suggestions were received. A classification of these responses showed that scheduling was of primary interest to the respondents, accounting for nearly 40 percent of the additional comments and suggestions. The general tenor of these comments and suggestions is summarized below.

Scheduling (464 Comments). Scheduling comments primarily expressed concern with providing more A.M. and P.M. service. Several riders requested that the systems "....add more buses for those who do not regularly work 9-5." The desire for earlier service in the morning and afternoon and later service (especially westbound in the evening) was mentioned repeatedly. One rider suggested: "Run occasional midday buses, especially on Friday, to serve early work departrees." The need for "more buses at shorter intervals" was also frequently voiced. Several complaints about SMMBL stemmed from overcrowding. A solution offered was that buses should be better spaced "....to resolve the problem of passengers having to stand all the way on one bus and the next bus being half full." One rider protested the simultaneous arrival of three unfilled buses at one stop, suggesting: "At least stagger them so the stragglers don't have to wait an hour." About half the scheduling comments on SCRTD dealt with on-time performance. "Buses are sometimes late," and "on occasion, a bus does not come." Riders also complained of early bus arrivals and departures and stated: "If a bus arrives at a stop early, it should not leave until the scheduled time."

General Encouragement and Observations (359 Comments). The general comments on SMMBL service were very favorable; e.g., "This is extremely convenient service;" "Faster, cheaper, more relaxing;" "very satisfied;" "I hope it continues in operation." Similar comments on SCRTD service included: "Really appreciate it;" "keep up the good work;" and "this service....is a necessary step in providing adequate mass transit in Los Angeles." About one-half of the SCRTD general comments specifically addressed the Diamond Lanes: "The Diamond Lane offers the most practical solution at a minimum expense to encourage traffic reduction and reduce car pollution;" "More Diamond Lanes--less smog;" "Keep buses on the Diamond Lane." While most comments were favorable, some riders did protest the limited use policy of the Diamond Lanes: "Strongly object to exclusive usurption of Diamond Lane" and "Would like Diamond Lane returned to high-occupancy vehicles." There was also frequent mention of opening up the Diamond Lanes to small two-seater automobiles.

Equipment and Operators (91 Comments). The most commonly voiced complaint about both SMMBL and SCRTD equipment pointed out the need for proper use of air conditioning: "Air conditioning is not always operational;" "Use the air conditioning!" and "Turn off air conditioning when not needed." Buses were most often rated as "clean, comfortable." One rider expressed the desire for "Big electric clocks inside the buses."

Most comments on operators mentioned the need for regular bus drivers who knew their routes well. "Acquaint new drivers with route before assignment," and "have regular bus drivers; don't change them every day; bus drivers are not familiar with their routes." For the most part, drivers were characterized by the riders as "courteous," "pleasant and helpful."

Fares (120 Comments). The majority of fare comments expressed concern with the increased fares (SCRTD on July 1 and SMMBL on August 1). "The fare increase is irritating," "be careful of raising fares too early....you'll scare them off;" "Sorry rates will be up." Riders also complained about the 10¢ surcharge: "We shouldn't be assessed an extra 10¢ surcharge for riding on a bus using the Diamond Lane;" "this can only hurt support for the Diamond Lane."

Public Information (48 Comments). Several riders perceived a definite need for wider advertising of the services: "Get people to ride by making them aware of the alternative to surface routes," "publicize routes more through offices, community meetings, gathering places...," "contact big companies downtown." Further comments requested "better posting of schedules;" "publish bus maps;" and "make tokens easier to buy...." Several riders asked for "more telephone operators at RTD information," stating that the lack of operators made it difficult to obtain route information.

Routes and Stops (11 Comments). In addition to suggestions for alterations of routes for passengers' convenience, riders mentioned: "A greater variety of routes would reach more people." One rider requested: "Have buses go more directly to the freeway." Finally, it was suggested that the city bus schedules be coordinated to facilitate transfers.

6.3.4.2 Demographics - The riders surveyed were almost evenly divided between male and female passengers. Most of the riders (76%) were between the ages of 18 and 44. Income figures show that 44% of the riders have a household income of $20,000 or more; almost half of those earn $30,000 or more. A worker mix of professionals (26%), administrators (24%) and clerical people (32%) made up 82% of the ridership surveyed, which is not surprising for a CBD-oriented bus service. Table 6.9 summarizes the demographic characteristics of SCRTD and SMMBL ridership.

The 601 (Pacific Palisades) and 608 (Malibu) lines had a higher percentage of males with higher incomes and professional and administrative jobs. Lines 603 and 607 had a higher percentage of women in the $10,000 to $20,000 household income bracket and with clerical jobs. SMMBL had a younger rider group (48% are between the ages of 18-29), and a wider, more representative spread over a range of incomes and occupations. SCRTD Lines 604 and 606 had an older group of riders, but a similar spread over incomes and occupation groups.

The surveyed riders were asked if they had a driver's license; 91.7% said yes and 8.3% said no. Eighty-five percent of those surveyed had one or two cars in their household, but there was some variation between riders of the two bus companies. There were more one-car households among SMMBL riders (61.3% versus 47.6% for SCRTD). On the other hand, 44% of SCRTD riders had two or more cars, while only 31%

TABLE 6.9

SUMMARY OF BUS RIDER DEMOGRAPHIC INFORMATION

		TOTAL (%)	RTD (%)	SMMBL (%)
Sex:	Male	50.2	51.0	47.7
	Female	49.8	49.0	52.3
		n = 1446	n = 1100	n = 346
Age:	< 18	.6	.8	--
	18-29	41.1	39.0	47.7
	30-44	34.6	34.9	33.3
	45-64	22.1	33.7	17.2
	65 +	1.6	1.5	1.7
		n = 1447	n = 1099	n = 348
Income:	< $5,000	4.1	3.6	5.7
	$5,000-9,999	12.3	12.3	12.2
	$10,000-14,999	21.2	20.6	23.2
	$15,000-19,899	18.4	18.1	19.4
	$20,000-29,999	23.8	24.6	21.2
		n = 1371	n = 1036	n = 335
Occupation:	Professional	26.3	26.3	26.0
	Administration	24.4	24.0	25.7
	Salesworker	7.5	7.0	9.0
	Clerical	31.7	32.4	29.3
	Student	3.3	2.8	4.8
	Retired	.7	.8	.6
	Other	6.2	6.7	4.5
		n = 1393	n = 1059	n = 334

of the SMMBL ridership did. The 1970 census figures for households in the West Los Angeles study area show that 13% of the study area households have no car, compared to 8.3% of the bus riders surveyed.

Number of Cars in Household	Total No.	Total %	SCRTD %	SMMBL %
No car	120	8.3	8.5	7.8
One car	736	50.9	47.6	61.3
Two cars	497	34.4	36.4	28.0
Three or more	93	6.4	7.5	2.9
n =	1446		n = 1100	n = 346

When asked if a car was available for the trip they were taking, 76% replied "yes, but I prefer to take the bus." A second group (8.4%) said a car was available but its use would inconvenience others. The remainder (15.6% or 225 riders) replied that the bus was the only way they could make their trip as no car was available to them; 159 of these (71%) were women.

Regular working hours governed the travel habits of 93.6% of the ridership; 77.4% of the riders surveyed started work between 8:00 and 9:00 A.M. and 98% started work between 7:00 and 9:00 A.M. Seventy-three percent of the riders finished work during a one-hour period, 4:30 to 5:30 P.M. Another 6% finished by 6:00 P.M. The time period of 4:00 to 6:00 P.M. covered 95% of the work-end hours of the bus riders surveyed.

6.3.5 Supply-Demand Relationships

Throughout the project, SCRTD and SMMBL management adjusted service levels in response to the ridership levels experienced on each of the Diamond Lane lines. Buses were added to such heavily patronized routes as the SCRTD 604 line and SMMBL Route 10. Buses were subtracted from SCRTD routes 601 and 605 and each of the Park-and-Ride routes. Two routes, SCRTD lines 602 and 774, were discontinued for want of patronage. Fares were raised by both SCRTD and SMMBL during the course of the demonstration.

Since changes in service frequency were made in response to perceived ridership trends, and because service cutbacks and fare increases were applied at close intervals in a period of overall ridership growth that continued even during the general summer downturn, no attempt was made to correlate service levels with demand on a line-by-line basis. On certain lines, the growth trend was so pronounced that service cutbacks and fare increases were followed by increased ridership. Moreover, the routes themselves were so diverse as to frustrate attempts to designate control routes for comparison purposes. However, certain general observations were possible regarding the patronage of specific routes and route groupings. These observations included estimates of the effect of the Diamond Lane itself on bus patronage and comparisons of predicted and actual levels of patronage on the different bus routes.

6.3.5.1 Diamond Lane Ridership Impact - Clues regarding the impact of the Diamond Lane itself on bus patronage may be obtained by examining ridership patterns of the four lines in existence prior to project implementation. Table 6.10 lists the average ridership levels on these lines before and after project implementation. On all lines except the 604 express service along Venice Boulevard, service frequencies were increased markedly with the initiation of the Diamond Lane project. On the day the Diamond Lane opened, the number of trips on the 601 line along Sunset Boulevard increased from two per day to eight per day, while the number of trips on the 605 Marina Del Rey line increased from nine to 19 per day and the number of trips on the 606 Culver Boulevard line doubled from seven to 14 per day. Because these marked improvements in service levels tend to obscure the impact of the preferential lane itself, the 604 line serves as the best indicator of the Diamond Lane's impact in generating bus ridership.

The 604 Venice Boulevard line is an established line with relatively stable ridership serving commuters from Venice to the Los Angeles CBD. No buses were added to this route with the implementation of the Diamond Lane, and the published schedule times did not change. After three weeks of Diamond Lane operation, three buses were added to the service to relieve standee pressure on peak-hour runs. Each added bus made one morning trip and one evening trip, bringing the total number of trips offered to 26 per day. For the first three weeks of the project, however, the only inducements to added bus ridership were those offered by the Diamond Lane itself. Prior to Lane implementation, buses inbound from Venice during the morning peak arrived in downtown Los Angeles approximately one minute early on a scheduled trip of 62 minutes. Buses using the Diamond Lanes arrived an average of 2.7 minutes earlier than their scheduled arrival time (see Section 6.2.3). Furthermore, the corresponding trip by single-person automobile was increased by an average of three minutes.

These Lane-associated inducements and the attendant Diamond Lane publicity resulted in a small but measureable increase in ridership on the 604 line. During the first three weeks of Lane operation, when service frequencies remained at pre-project levels, line patronage increased from an average of 730 riders per day to an average of 776 riders per day. This 6.3% increase in daily ridership was statistically significant at the .05 level. Even after the addition of six daily bus trips on April 5, the average patronage remained at a level of 776 riders per day. Given the relatively minor increase in service frequencies over the length of the project and the fact that these increases had no noticeable impact on ridership, a substantial part of the 6.3% ridership increased identified in Table 6.10 may be attributed to the Diamond Lane itself. It is impossible to determine what aspect of the Diamond Lane was responsible for this upturn, which could have been caused either by the time savings or the attendant publicity.

TABLE 6.10

BEFORE-AFTER COMPARISON OF AVERAGE

RIDERSHIP AND TRIP LEVELS ON PRE-IMPLEMENTATION BUS LINES

Line Number	Average Riders/Day			Trips/Day				Rider-Trip Relationships	
	Before (1)	During (2)	% Change (3)	Before (4)	Start (5)	Average During (6)	% Change (7)	Δ Ridership/Δ Trips (2-1)÷(6-4)	% Ridership Change/ % Trip Change (3)÷(7)
601	50	101.2	102.4%	2	8	7.1	255%	10.04	.40
604	730	776.0	6.3	20	20	24.4	22	10.45	.29
605	214	305.9	42.9	9	19	14.0	55.6	18.38	.77
606	157	244.4	55.7	7	14	12.8	82.9	15.07	.67
Total	1151	1427.5	24.0%	38	61	58.3	53.4%	13.62	.45

Increases on the other three bus routes existing prior to Diamond Lane implementation were far more pronounced than those on the 604 Venice Boulevard line. However, service frequencies were increased dramatically on these lines at the time of Lane implementation. Average increases over the length of the project amounted to 102.4% for the 601 Sunset Boulevard line, 42.9% for the 605 Marina Del Rey line, and 55.7% for the 606 Culver Boulevard line. Because of the marked improvements in service frequencies on these routes, it is difficult to pinpoint the precise contribution of the Diamond Lane itself to these patronage increases.

Another way to isolate the impacts of the Lane itself on route patronage is to monitor ridership levels following the close of the Lane while service frequencies remain at high levels. Post-project ridership levels were monitored for this purpose, although resultant comparisons were muddied somewhat by the effects of the SCRTD strike which occurred a few weeks following project termination. The results of these comparisons appear in the Postscript of Section 6.5.

On the strength of the analysis performed on the 604 Venice Boulevard line, it appears that the introduction of new bus service and the marked improvement of existing service frequencies had a far more pronounced effect on ridership levels than the dedication of the Diamond Lane to the exclusive usage of high-occupancy vehicles. The Diamond Lane itself, and the accompanying notoriety, appears to have been capable of increasing ridership by no more than 6.3% on the 604 line in the absence of other improvements in coverage or service frequency.

Following the close of the demonstration and the five-week SCRTD strike, ridership levels on the 604 line were only seven percent below the levels achieved during the peak of Diamond Lane operation, tending to confirm the observation that the lanes themselves had a minimal impact on the line's ridership. As SCRTD officials have pointed however,[10] it is difficult to draw conclusions on the basis of the 604 line alone. The line has been in existence for many years and had already achieved an estimated market penetration of 40% of the available home-work trips in its service area prior to the Diamond Lane demonstration. This high penetration could be attributed both to "...the many years of operation of the line, which gave it much exposure and an image of permanence, and the economic characteristics of persons within the passenger shed." Since the line serves the lowest income population in the Westside study area, its potential riders could be expected to be more sensitive to cost considerations in selecting travel modes than to the improvements in travel time accompanying the Diamond Lanes. Accordingly, SCRTD officials felt that the market for downtown travel on the 604 line was saturated prior to the initiation of the Diamond Lanes, and elected not to increase the number of buses on the line with the implementation of the project. Thus, the continued operation of improved bus service on other lanes following the closing of the Diamond Lanes provides a wider basis for testing the impact of the lanes themselves on bus ridership (see Section 6.5).

6.3.5.2 <u>Early Patronage Predictions Versus Actual Performance</u> - A comparison of early patronage predictions with the actual performance of each line in generating ridership provides a useful framework for analyzing the strengths and weaknesses of each line. Rough patronage estimates were made early in 1975 by the members of the Joint Project Board as part of the planning process accompanying the preparation of the Demonstration Grant Application (Reference 6.1). These estimates were made using origin-destination data from the 1967 Los Angeles Regional Transportation Study (LARTS). As noted by the estimators themselves, this survey had several shortcomings as a forecasting tool: "(1) it is eight years old; (2) many high-density housing areas have been developed in the study area since 1967; and (3) because of the small (one percent) sample, the data is more reliable for aggregated areas than for zone-by-zone analysis" (Reference 6.1). The compelling argument for using the LARTS data in the face of these shortcomings, as cited by the forecasters, was that "...it exists."

Patronage estimates on each line were made by accumulating the number of CBD-destined work trips within the service area of each proposed route and assigning a fixed proportion of these trips to the proposed service. As described by the forecasters,

> "Patronage was estimated for the eight multi-stop 'feeder/express' routes by accumulating the percentage of LARTS work trips for portions of each zone that are within walking distance of each proposed bus route and are destined to any one of 20 LA CBD zones. The potential market thus computed was estimated to be 6,330 passengers for all eight lines. Comparison of the estimate for the proposed Venice Blvd. route with current actual passenger counts on SCRTD Line 75F (which is essentially identical to and will be replaced by proposed Line 604) shows that present ridership amounts to about 40 percent of the estimate. Figures from studies done on SCRTD's El Monte Busway show that between 25 and 30 percent of the potential LA CBD or Wilshire District work trips that are within the service area of the Busway lines were attracted to transit. On the basis of this analysis it was estimated that each 'feeder/express' route would draw 30 percent of its potential market. Patronage for the three park/ride lines was developed by assigning the work trips in those study area zones that are destined to the LA CBD and that are not assigned to a 'feeder/express' route, to the park/ride lot to which the trip maker would most likely be attracted. The criteria for this assignment were: (1) access by a main arterial; (2) on a more or less direct route to the LA CBD; and (3) with only minor backtracking.....Estimated patronage for the park/ride lines was based on a 30 percent share of the market, as outlined above."

Application of the above criteria resulted in the identification of 11,814 daily bus rides to and from the Park-and-Ride lots, and 12,660 daily bus rides on the feeder/express freeway service. Thus, a total of 24,474 potential daily bus rides were identified and associated with a specific line or Park-and-Ride service. In forecasting future patronage, the proposed bus service was assumed to attract 30 percent of these rides. No attempt was made to differentiate between lines on the basis of frequency of service or competitive position _vis a vis_ either the automobile or existing local bus service. This failure to reflect service levels introduced another major source of potential error to the forecasts, in addition to the age of the LARTS data base. These shortcomings were recognized by the forecasters, who noted that although their total ridership estimates appeared reasonable, "...the individual line estimates are probably off by substantial amounts" (Reference 6.1).

Table 6.11 compares early forecasts of ridership on each line with the average daily ridership achieved over the entire period of Diamond Lane operation and with the average ridership during the twenty-first week, the last representative week of Lane operation. This table should not be viewed as an indictment of the forecasters, who operated with a limited data base, recognized and reported on its limitations and were, in any case, anticipating a longer period of maturation for the lines than the 21-week period portrayed in Table 6.11. Rather, the table should be viewed as a framework for com paring the relative expectations of each line with the line's performance and for investigating the reasons why expectations were exceeded in some instances and totally unfulfilled in other instances.

As shown in Table 6.11, aggregate predictions of daily ridership on all feeder/express runs compared favorably with the actual level experienced at the close of the project. Whereas an estimated 3,762 rides per day were predicted, an average of 3,524 were actually made during the final week of the project. Had the project continued and the SCRTD strike been averted, then, it appears likely that total ridership on all feeder/express lines would have exceeded early expectations. In the case of the Park-and-Ride lots, however, ridership fell far short of predicted levels.

The early predictions reflected in Table 6.11 were never used directly to size the system or fix levels of service on the different lines. Rather, service levels were set by adopting a policy that service on all Diamond Lane lines would not be allowed to drop below a standard of 15-minute headways during the peak hour and a half in the morning and evening. It was felt that this policy would maximize the possibility of attracting patronage early in the project, and that service levels could be adjusted later in response to ridership. SCRTD officials have since noted that this policy of providing more than enough service early in the project resulted in a large number of empty buses in the Diamond Lane, which in turn may have added to the ill will created by the project.

Line-by-Line Breakdown: Feeder/Express Service

As anticipated, even though the aggregate predictions of ridership on feeder/express runs closely matched actual project experience, wide variations were to be found on individual lines. Some of the more important reasons for these variations are discussed below on a line-by-line basis.

TABLE 6.11

LINE-BY-LINE COMPARISON OF

EARLY PREDICTIONS WITH ACTUAL RIDERSHIP

	Line Number	Estimated No. of Home-Work & Work-Home Trips Between Service Area & LA CBD	Early Predictions of Daily Ridership (both peak directions)	Average Daily Ridership Over ◊ Lane Operation (both peak directions)	Average Ridership During 21st week (both peak directions)
ORIGINAL LINES	601	2060	618	101.2	93.5
	604	2420	726	776.0	747.0
	605	200	60	305.9	369.5
	606	1500	432	244.4	295.5
	Subtotal, Original Service	6180	1836	1427.5	1505.5
NEW FEEDER/EXPRESS LINES	602	520	156	237.7	347.0
	603	3140	942	56.0	*
	607	1670	482	320.6	453.0
	608	**	**	137.1	143.0
	SM10	1150	346	870.0	1075.0
	Subtotal, New Feeder/ Express Lines	6480	1926	1621.4	2018.0
	Subtotal, All Feeder/ Express Lines	12660	3762	3048.9	3523.5
PARK & RIDE LINES	708	3718	1112	207.1	155.0
	746	5062	1522	143.5	115.0
	774	3034	912	79.7	*
	Subtotal, PAR Lots	11814	3546	430.3	270.0
TOTAL		24474	7308	3479.2	3793.5

+Source: Grant Application (Reference 6.1).

*Line discontinued before 21st week.

**608 Line not contemplated at time predictions were made.

Line 601 (Sunset Boulevard: Predicted Daily Ridership 618; Average 101; Ending 94). Early predictions grossly overestimated the ridership on the 601 line. Whereas a potential passenger pool of 1,030 inbound trips was identified in the service area, many of these are located near the end of the line, requiring a long bus ride over surface streets and increasing the automobile's competitive advantage. Examination of travel times reported in the on-board surveys make it plain that most of the line's riders came from the portion of Sunset Boulevard nearest to the San Diego Freeway, where the bus travel times compare more favorably with the automobile. Passengers near the end of the line, moreover, have quicker access to the CBD via the 608 line, which was not envisioned when the early predictions were made.

Line 604 (Venice Boulevard: Predicted Daily Ridership 726; Average 776; Ending 747). Ridership on this longstanding line has been discussed in Section 6.3.5.1. Predictions agree well with actual ridership levels, being slightly lower because no attempt was made in the early forecasts to reflect the then-unknown impact of the Diamond Lane itself on line ridership.

Line 605 (Marina Del Rey: Predicted Daily Ridership 60; Average 305.9, Ending 369.5). Here the LARTS data presented a real problem and accounts for the marked understating of ridership. Eighty to ninety percent of the high-density housing in Marina del Rey was built following the LARTS survey. This problem was recognized by the planners, who fortunately had the performance of line 605 prior to Diamond Lane implementation as a more reliable guide to likely ridership levels.

Line 606 (Culver Boulevard: Predicted Daily Ridership 432; Average 244; Ending 296). Riders on this line reported longer average door-to-door travel times than riders on any of the other Diamond Lane routes. These long travel times lead to more unfavorable bus-automobile travel time comparisons and help to account for the line's failure to meet early expectations. Nevertheless, the line performed creditably, and ridership increased near the end of the project when the route was extended to Manhattan and Hermosa Beaches.

Line 602 (Beverly Glen Boulevard: Predicted Daily Ridership 156; 156; Average 238; Ending 347). Again, the LARTS data understated the potential passenger pool, as much high-density housing replaced single-family units along Beverly Glen Boulevard following the LARTS survey. Line ridership jumped appreciably after May 24, when the route was shifted to more densely populated streets following complaints from the Cheviot Hills Homeowners' Association.

Line 603 (Century City: Predicted Daily Ridership 942; Average 56; Discontinued July 7). Although this route served a larger pool of potential passengers than any other feeder/express route and hence was accorded a larger potential ridership in the early forecasts, it proved to be the poorest performer of all the Diamond Lane routes and was discontinued on July 7, 1976. The reason for the line's poor performance may be traced to its poor competitive position with respect to both the automobile and to existing bus service (see Section 6.2.2.1). By the time the bus had traveled south down La Cienega Boulevard to the Santa Monica Freeway, traveled the Freeway, and made the northbound distribution run through the Los Angeles CBD, an automobile traveling directly on surface streets could make the door-to-door trip in slightly over half the time. Existing multi-stop bus service along such surface streets as Wilshire and Olympic Boulevards offered more frequent service during peak hours and made the trip to the northern portion of the CBD almost as quickly as the 602 line.

Line 607 (LAX Airport: Predicted Daily Ridership 482; Average 321; Ending 453). Ridership on this line increased steadily throughout the project and was approaching the level set in early forecasts when the project ended. The on-board survey shows that some of the increases observed late in the project may be attributed to diversions from SCRTD Line 51, which was rerouted away from airport service midway in the demonstration.

SMMBL Line 10 (Santa Monica: Predicted Daily Ridership 346; Average 870; Ending 1075). The performance of the Santa Monica Blue Diamond Express exceeded all pre-project expectations. In the absence of previous express service, the Santa Monica run to the LA CBD cut an estimated 30 minutes off pre-project travel times by bus. Because the bus entered the Santa Monica Freeway at Bundy Drive relatively early in its route, it also provided a level of service more competitive with that of the automobile (see Section 6.2.2.1). The Santa Monica service offered its patrons relatively new equipment and ran throughout the day as an added inducement to ridership. All of these reasons help to explain why the Santa Monica service claimed a larger share of the potential market for trips to the LA CBD than any other route.

Line-by-Line Breakdowns: Park and Ride Service

None of the three Park and Ride lots opened with the initiation of Diamond Lane service measured up to pre-project expectations. Whereas early estimates of patronage projected 3,546 daily riders from these lots, only 270 had materialized by the project's close, and Park and Ride Lot patronage was on the decline at that time. Many explanations may be cited for this shortfall, but the chief reason seems to reside in a gross overstatement of the number of areas effectively served by each lot. Early patronage estimates assigned all potential CBD trips in the Westside study area that were not within walking distance of a feeder/ express route to the

Park/Ride lot best serving that trip. As a result, CBD trips originating at a considerable distance from many lots were assigned to the lot's potential passenger pool and, because of the practice of estimating patronage as a function of the size of the pool, these distant trips were accorded the same 30 percent chance of patronizing the route as trips with much better access to the lot itself. In actuality, most patrons of Park and Ride lots came from the immediate vicinity of the lot. Even discounting the overstatement of potential ridership, the general performance of the lots was poor, and the operation of each lot has subsequently been discontinued. One lot, the Century City lot serving Route 774, was discontinued seven weeks after project implementation, while the two remaining lots were discontinued following the termination of the Diamond Lane demonstration.

Line 708 (Santa Monica Park-and-Ride: Predicted Daily Ridership 1112; Average 207.1, Ending 155). The Santa Monica Park and Ride lot had better freeway access, a wider service area, and higher ridership than either of the other two lots. The lot, which was within one-half mile of the freeway, attracted riders from the entire City of Santa Monica. The largest percentage of riders originated along Ocean Park Boulevard and passed the lot on their normal journey to the freeway. Although original estimates, based on a slightly different lot location, anticipated a large share of riders from the Pacific Palisades-Brentwood Heights area, none of this patronage materialized.

Line 746 (Fox Hills Park and Ride: Predicted Daily Ridership 1522; Average 144; Ending 115). Original ridership estimates for this lot were based on a sphere of influence which included Westchester, El Segundo, and the Marina area and which was far greater than that which finally developed. Roughly half of the users of the Fox Hills lot traveled less than one mile to reach the lot. Because the route followed by Line 746 required five miles of travel along La Cienega before the Santa Monica Freeway was reached, the relative advantage of automobile travel time was never seriously threatened by the service.

Line 774 (Century City Park and Ride: Predicted Daily Ridership* 912; Average 80; Discontinued May 10). Service to this lot was discontinued prior to the on-board survey, so that the area from which it drew its few riders is unknown. The lot's location was not the first choice of SCRTD planners, and suffered from many of the same drawbacks as the ill-fated 603 line. Too close to the CBD, it could not compete favorably with either the automobile or existing multi-stop bus service. Furthermore, its two-mile journey to the freeway required a certain amount of backtracking away from the CBD.

6.3.5.3 Fare Elasticities - On July 1, 1976, fares on the nine SCRTD bus routes using the Diamond Lane, including the two remaining Park-and-Ride routes, were increased from between 0% and 80% depending upon the type of fare paid and the number of zones crossed. This fare increase came at a time of general ridership growth on some lines and service cutbacks on others. These accompanying changes made it difficult to isolate the effects of the fare increase on ridership. Nonetheless, an exploration of the sensitivity of

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*Early ridership predictions were based on a parking lot location closer to Westwood with a slightly different service area.

SCRTD ridership to fare levels was undertaken. A subsequent increase in the SMMBL fare was introduced on August 2, 1976, too close to the closing of the Diamond Lane to make a meaningful analysis of this fare increase possible.

Fare Changes. Fares on the SCRTD bus routes, both before and after the fare change, depended upon a number of factors including the route itself, the number of zones crossed, whether cash was paid or a monthly pass was used, or whether a transfer was taken. The increases for these individual charges varied, and as noted, ranged from 0% to 80%. The results of the June 27 on-board survey were used to determine the average fare increase for each SCRTD route. On these surveys, passengers were asked how much their fare was and what type of trip they were taking. For passengers using monthly passes, passengers were asked how often they made their trip in order to determine their fares. The results were then averaged to obtain the average fare before the fare change. In order to obtain the average fare after the change, the same proportions of passengers were assumed to pay the same type of fares as before the change.

The results of the average fare analysis are listed in Table 6.12. For the sake of completeness, SMMBL average fares have been included. In six of the nine SCRTD cases, average fare increases of around 55% were computed. Route 602, which is the only one-zone route, had an average fare increase of 71.1%. Finally, the two Park-and-Ride routes had average fare increases of around 32% and 34%, respectively. Conventional transit fare elasticity equations imply a fare elasticity of one-third, meaning that most of the routes should have had ridership decreases of around 18% and the Park-and-Ride routes should have lost about 11% of their patronage.

Ridership Changes. Since the SCRTD fare changes occurred toward the end of the 16th week of the project's operation, there is a 16-week period which represents ridership before the fare change and a 5-week period following the fare change. If one compares these five "after" weeks to the 16 "before" weeks, one finds a general ridership increase, as shown in Column B of Table 6.13. However, this is because seven of the nine routes had increasing ridership trends during the Diamond Lane project (Routes 601 and 708 had decreasing ridership trends). Consequently, it is necessary to control for these ridership trends before assessing the effect of the fare changes.

In characterizing these ridership trends, a linear growth pattern was assumed and a straight-line regression was fitted over time to the ridership patterns existing prior to the fare increase.* Table 6.13 summarizes the results obtained a linear growth pattern. Column C contains the changes in ridership resulting from the fare change, after considering the overall ridership trends. Column D indicates the proportion of ridership variability explained by the ridership trends and the

*A logarithmic growth trend was also assumed for purposes of comparison. The results obtained using this curvilinear model were not significant different from those obtained assuming a linear growth trend over the short time periods involved.

TABLE 6.12

AVERAGE FARES BEFORE AND AFTER FARE INCREASES

Bus Route	Average Fare* (¢)		Percent Increase
	Before Increase	After Increase	
SCRTD 601	53.60	82.75	54%
SCRTD 602	25.39	43.44	71%
SCRTD 603	26.23	Cancelled 7/2/76	---
SCRTD 604	35.06	54.67	56%
SCRTD 605	49.32	76.14	54%
SCRTD 606	38.79	60.70	56%
SCRTD 607	29.26	46.66	59%
SCRTD 608	48.69	75.23	55%
SCRTD 708	72.91	97.81	34%
SCRTD 746	49.66	65.48	32%
SCRTD 774	49.66	Cancelled 5/6/76	---
SMMBL 10	41.80	58.30	39%
All Routes (weighted by ridership)	41.3	61.3	48%

*SCRTD fares increased on July 1, 1976;
SMMBL fares increased on August 2, 1976.

TABLE 6.13

CHANGES IN SCRTD BUS RIDERSHIP DUE TO FARE CHANGES (7/1/76)

Route	% change in ridership: 5 weeks after compared to 16 weeks before	% change in ridership after controlling for linear growth trend	Multiple-R^2 of growth & fare effect	Statistical significance of fare effects (α)
(A)	(B)	(C)	(D)	(E)
601	- 6.1%	+14.5%	.19	.99
602	+40.3%	- 5.5%	.87	.99
604	- 1.6%	- 4.7%	.09	.21
605	+ 6.8%	- 8.8%	.57	.08
606	+32.8%	+16.1%*	.78	.02
607	+36.8%	-4.1%	.88	.99
608	+11.2%	- 7.6%	.37	.99
708	-33.2%	-28.0%	.84	.001
746	-18.0%	-58.7%	.72	.001

*Ridership on Route 606 was also increased in the period under study by the extension of the route to Manhattan and Hermosa Beaches.

fare changes, while Column E reports the statistical significance of the measured changes. For the purposes of this study, an α value of less than .05 was required for statistical significance. As indicated, the small samples (only five weeks after the fare change) cause most of the observed changes to be statistically insignificant. The most dramatic changes occurred in the two Park-and-Ride routes, where large and highly significant ridership declines were recorded. On the other routes, the ridership changes tend to be rather small, and an increase in ridership is sometimes reported even after controlling for the overall ridership growth. The results are generally not statistically significant.

Fare Elasticities. Having computed the average fare increase and the changes in ridership for each route, fare elasticities can be computed for each route. These are plotted in Exhibit 6.12 for both ridership growth assumptions. Also shown is an elasticity curve estimated by SCRTD in response to an UMTA request that premium fares be considered for Diamond Lane bus service.* As can be seen, except for the two Park-and-Ride routes, demand elasticities were found to be rather low (below .2), and less than those predicted by SCRTD. (The cases in which a ridership gain actually occurred are plotted below the horizontal axis.) Demand for the two Park-and-Ride routes, however, was found to be very elastic, with elasticities between 0.8 and 1.8. Demand for these services was apparently much more sensitive to fares than demand for the other routes. It appears that the fare increases applied the *coup de grace* to the already disappointing Park-and-Ride patronage levels.

6.4 PRODUCTIVITY AND ECONOMICS

6.4.1 Operator Costs, Revenues and Deficits

An important feature of the Diamond Lane project was that no major capital costs were incurred for transit operations, as compared to the capital investment required to launch rapid rail or exclusive busway projects. Diamond Lane buses could be, and in fact were, added and reassigned to other routes in the SCRTD and SMMBL systems on a very short-term basis. For this reason, the following analysis is focused on transit operating costs, or variable costs. The analysis does not reflect the effects of such capital, or fixed, costs as depreciation of vehicles and terminals. These capital expenditures typically represent a small percentage of the total cost of a bus operation such as the Diamond Lane express service.

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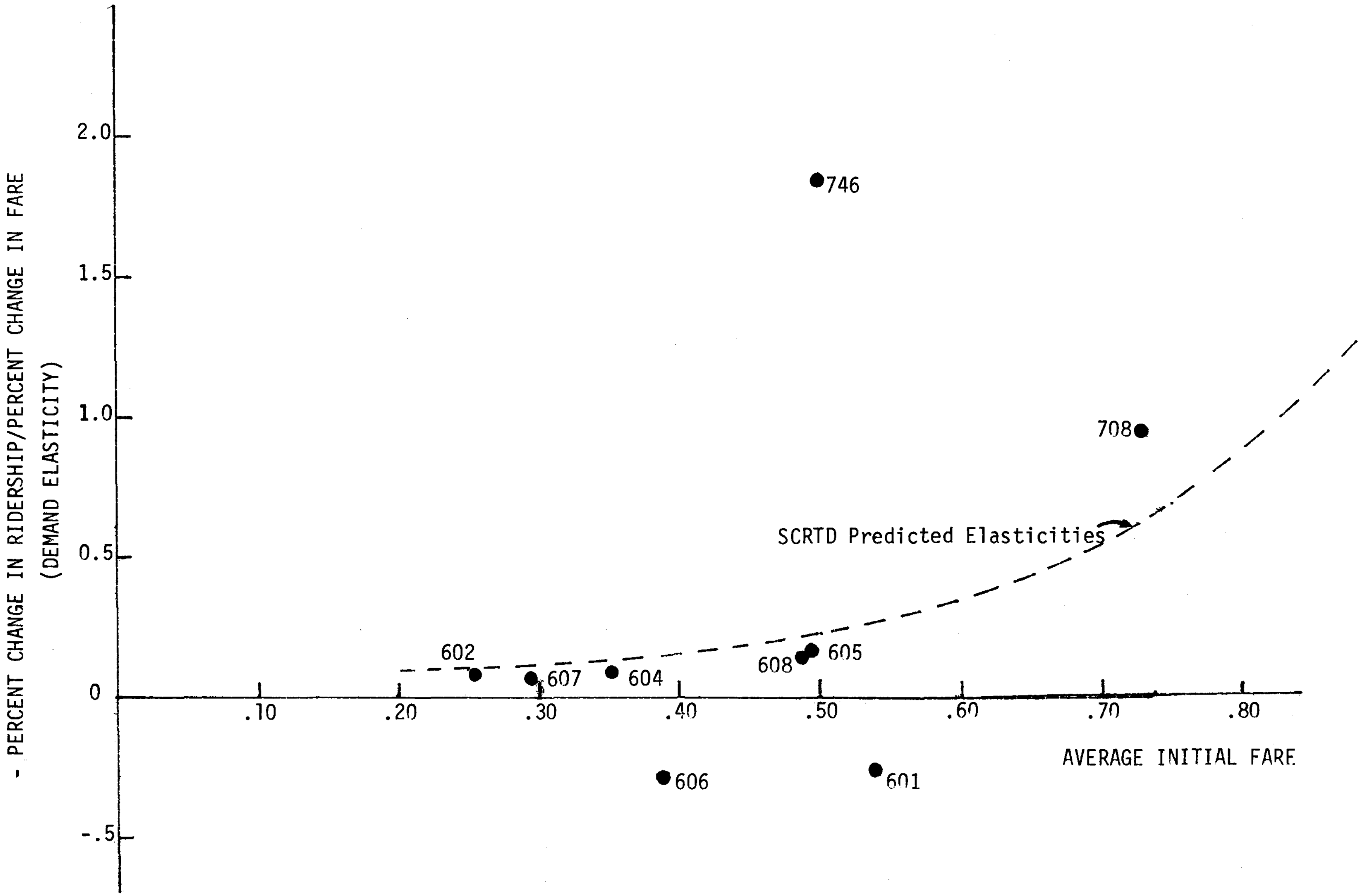
*Memo from Gerald L. Squier of SCRTD to George L. McDonald, "Effect of A Premium Fare on Expected Patronage: Santa Monica Freeway Preferential Lane Project" (June 4, 1975).

EXHIBIT 6.12

SCRTD FARE ELASTICITIES



SCRTD Variable Costs

SCRTD's original estimates of the transit operating costs for the project over the one-year period commencing March 15, 1976 were:

Bus Operations (Freeway express and Park-and-Ride operations)	$2,263,000
Park-and-Ride lots (preparation, leasing and personnel)	198,500
Total	$2,461,500

This reduces to an average daily cost of $9,846 based on a 250-day year. For fiscal year 1977, SCRTD estimated that the total costs for the project would be $2.59 million, or an average daily cost of $10,360, which is a 5.2% increase over the original estimate for fiscal year 1976.

The variable cost factors for systemwide SCRTD operations are shown in Table 6.14. These costs are derived from the cost formula that SCRTD uses to estimate the cost of new services such as the Diamond Lane express routes. Costs are separated into two components: cost per mile and cost per pay-hour. The total variable cost is the sum of six categories. Overhead costs consist of transportation supervision, bus parts, maintenance, cleaning, scheduling, surface planning, customer relations, stores and facilities engineering. The general and administrative category includes expenses for the Board of Directors, top management, administration, legal, Equal Employment Opportunity, marketing, employee relations, fiscal, data processing, and purchasing. Note that the largest component of this formula is $9.07 per hour for drivers' wages and benefits. This formula does not include a capital cost component for depreciation and, hence, is restricted to operating cost.

SMMBL Variable Costs

SMMBL's bus operating costs for the project were originally estimated at $325,000 for the one-year period beginning March 15, 1976. This reduces to an average daily cost of $1,300.

The SMMBL operating costs are reduced to a per-mile cost of $1.18/ vehicle-mile, excluding depreciation of publicly-funded buildings and equipment. This cost per mile was increased to $1.29/vehicle-mile on July 1, 1976 because of a 13% driver pay increase from $5.72/hour to $6.47/hour.

TABLE 6:14

SCRTD VARIABLE COST FACTORS*

		COST/MILE	COST/HOUR
1.	Drivers' Wages (X_1)	--	$ 6.670
2.	Drivers' Fringe Benefits (36% of #1)	--	2.400
3.	Direct Operating Expenses (X_2)	$.1440	--
4.	Overhead (62.3% of #1, #2, #3)	.0898	5.6506
5.	Liability Insurance (X_3)	.0750	--
6.	General and Administrative (6.2% of all)	.0190	.9127
	TOTAL VARIABLE COST	$.3278	$15.6345

$$\text{Total Variable Cost} = 1.062\ (1.623\ [1.36X_1 + X_2] + X_3)$$
$$= 2.344X_1 + 1.7236X_2 + 1.062X_3$$
$$= \$15.6345/\text{hour} + \$.3278/\text{mile}$$

* Source: SCRTD Internal Memo
From: J. B. Scatchard
To: Howard Beardsley
Subject: New Services Cost Formula
Date: February 10, 1976

Average Daily Costs

Based on the above cost estimates and data on vehicle-miles and -hours, the average daily costs of the project were computed and are listed in Table 6.15 for both SCRTD and SMMBL. The combined average daily cost rose from $9,519/day during the first week of project operation to a maximum of $11,219/day during the sixth week of operation, finally dropping to $8,834/day during the closing weeks of the project. The total cost of transit operations during the 22-week project period was $1,050,954, with a mean of $9,822/day.

These costs are plotted separately for each participating transit company. SCRTD incurred a total of $915,278, or 87% of the project operating costs. The average SCRTD daily cost during the project was $8,554/day. This is slightly lower than the original estimate of $9,052/day, excluding Park-and-Ride lot costs. As service on unpatronized routes was cut back, SCRTD costs dropped to $7,323 per day by the close of the project. SMMBL averaged $1,268/day , with costs ranging from $1,108/day during the first week of the project to $1,511/day during the final week.

Average Daily Revenues

The total passenger revenue generated during the 22-week project period is estimated to be $164,673, yielding a net deficit of $886,281. The combined average daily revenues are listed in Table 6.15. These revenues were computed using the average fares estimated from the on-board bus rider survey for both cash patrons and monthly pass users (see Table 6.12).

The average daily revenue for SCRTD increased from $1,165 per day during the 15th week of project operation to $1,652 per day --a 42% increase -- during the 17th week after the fare increase on July 1, 1976. Similarly, SMMBL's average daily revenue increased from $459 per day to $627 per day -- a 27% increase -- following the 39% fare increase on August 2, 1976.

Average Daily Deficits

Given the average daily costs and revenues presented in Table 6.15, the total transit operating deficit was $886,281, or an average of $8,283 per day. The minimum daily deficit was $6,505 occurring during the 21st project week, and the maximum was $9,814, incurred during the sixth week of operation. SCRTD's average daily deficit was $792,121 for its Diamond Lane routes.

6.4.2 Productivity Measures

Transportation analysts commonly use many measures of public transit system performance. Each indicates a different aspect of the system operation. Several of these performance indicators have been computed for Diamond Lane transit service. The results are tabulated in Table 6.16 with supply factors in the top half and productivity measures in the lower half. These measures were compiled separately for old SCRTD routes, new SCRTD routes, SCRTD Park-and-Ride routes, and SMMBL Route 10.

TABLE 6.15: DIAMOND LANE PROJECT TRANSIT OPERATOR AVERAGE DAILY* COSTS, REVENUES,** AND DEFICITS

Diamond Lane Project Week	SCRTD ROUTES			SMMBL ROUTES			ALL ROUTES		
	Daily Cost	Daily Revenue	Daily Deficit	Daily Cost	Daily Revenue	Daily Deficit	Daily Cost	Daily Revenue	Daily Deficit
Before Averages	$2,199	$ 458	$1,741	$0.00	$0.00	$ 0.00	$ 2,199	$ 458	$1,741
1	$8,411	$ 844	$7,567	$1,108	$200	$ 908	$ 9,519	$1,044	$8,475
2	8,411	944	7,467	1,108	265	843	9,519	1,209	8,310
3	8,551	954	7,597	1,258	326	932	9,809	1,280	8,529
4	8,521	1,006	7,515	1,265	331	934	9,786	1,337	8,449
5	9,206	901	8,305	1,265	321	944	10,471	1,222	9,249
6	9,954	1,054	8,900	1,265	385	880	11,219	1,439	9,780
7	9,954	1,010	8,944	1,207	381	826	11,161	1,391	9,770
8	9,954	1,041	8,913	1,228	394	834	11,182	1,435	9,747
9	8.940	1,078	7,862	1,228	386	842	10,168	1,464	8,704
10	8,940	1,067	7,873	1,228	381	847	10,168	1,448	8,720
11	8,940	1,122	7,818	1,226	394	832	10,166	1,516	8,650
12	8,940	1,108	7,832	1,226	447	779	10,166	1,555	8.611
13	8,940	1,049	7,891	1,227	392	835	10,167	1,441	8,726
14	9,105	1,104	8,001	1,227	442	785	10,332	1,546	8,786
15	9,105	1,165	7,940	1,249	471	778	10,355	1,636	8,719
16	8,632	1,433	7,199	1,296	437	859	9,928	1,870	8,058
17	7,323	1,652	5,671	1,343	446	897	8,666	2,098	6,568
18	7,323	1,636	5,687	1,343	439	904	8,666	2,075	6,591
19	7,323	1,569	5,754	1,343	469	874	8,666	2,038	6,628
20	7,323	1,596	5,727	1,511	459	1,052	8,834	2,055	6,779
21	7,323	1,628	5,695	1,511	627	884	8,834	2,255	6,579
22	7,323	1,435	5,888	1,511	615	896	8,834	2,050	6,784
SUMMARY STATISTICS FOR THE 22-WEEK PROJECT PERIOD									
Total	$915,278	$123,157	$792,121	$135,676	$41,516	$94,160	$1,050,954	$164,673	$886,281
Mean	$8,554	$1,151	$7,403	$1,268	$388	$880	$9,822	$1,539	$8,283
Std Dev	$833.88	$283.50	$1,045.03	$113.15	$112.23	$60.74	$774.27	$375.88	$1,029.85
Coeff Var	.10	.25	.14	.09	.29	.07	.08	.24	.12
Minimum	$7,323	$622	$5,639	$1,108	$148	$760	$8,666	$839	$6,505
Maximum	$9,954	$1,684	$8,993	$1,511	$645	$1,051	$11,219	$2,289	$9,814

*For peak period operation during Diamond Lane project hours.
**Revenues from riders in the peak direction of travel.

TABLE 6.16

DIAMOND LANE TRANSIT SYSTEM PEAK PERIOD SUPPLY AND PRODUCTIVITY MEASURES

SUPPLY FACTORS	SCRTD Old Routes	SCRTD New Routes	SCRTD P-A-R Routes	SCRTD All Routes	SMMBL Route 10	Both SCRTD and SMMBL
Scheduled Trips per day*	58.3	36.6	37.1	132.0	21.0	153.0
Fleet Size (Buses)	27.1	16.8	14.0	58.0	9.8	67.8
Vehicle Hours per day*	149.6	120.0	79.1	348.7	52.3	401.0
Vehicle Miles per day*	2,181	1,758	949	4,888	1,046	5,934
Effective Vehicle Speed (mph)	14.6	14.8	12.4	14.1	20.0	14.8
Operating Cost per day*	$3,675	$2,958	192	$8,554	$1,268	$9,822
PRODUCTIVITY MEASURES	**SCRTD Old Routes**	**SCRTD New Routes**	**SCRTD P-A-R Routes**	**SCRTD All Routes**	**SMMBL Route 10**	**Both SCRTD and SMMBL**
Riders per day**	1,428	686	380	2,494	870	3,364
Riders per vehicle hour**	9.6	5.6	5.3	7.2	16.6	8.4
Operating Cost per rider**	$2.60	$4.86	$5.02	$3.49	$1.52	$2.99
Operating Cost per vehicle hour	$24.61	$24.85	$24.51	$24.53	NA	$24.53
Operating Cost per vehicle mile	$1.68	$1.68	$1.99	$1.75	$1.21	$1.65
Average Occupancy Rate	24.6	19.0	10.9	19.2	41.1	22.2
Revenue per Rider**	$.46	$.34	$.66	$.46	$.44	$.45
Deficit per Rider**	$2.14	$4.52	$4.36	$3.03	$1.08	$2.54

* For Peak Period Operation

** Riders on the Santa Monica Freeway in the Peak Period Direction of Travel Only (the deficit does not reflect SMMBL riders in the off-peak direction)

Old Routes: 601, 604, 605, 606
New Routes: 602, 603, 607, 608
P-A-R Routes: 708, 746, 774

Supply Factors

The average number of SCRTD Diamond Lane buses in service was 58.0. These buses were operated for an average of 348.7 vehicle-hours per day, running 4,888 miles per day during peak periods.

SCRTD allocated just under half of its resources to routes which were operating prior to the Diamond Lane project (601, 604, 605, and 606). Forty-seven percent of its project buses, 44% of total trips, and 43% of the costs were spent operating these routes.

Riders Per Vehicle-Hour

As indicated in Table 6.16, the productivities were generally higher on the previously-established routes and lowest on the Park-and-Ride routes. The SCRTD Diamond Lane buses averaged 7.2 riders per vehicle-hour. This is considerably lower than the SCRTD system-wide average of 44.26 riders per vehicle-hour. To place these results in perspective, it is necessary to be aware of two assumptions that were made. To compute the productivities shown in Table 6.16, only riders who actually made the trip on the Santa Monica Freeway in the peak direction were counted; that is, riders who made reverse commute trips or short trips off the Freeway were not included in the ridership counts. This obviously understates the total ridership and productivity and, hence, overestimates the cost per rider. SCRTD reports that very few riders used the service for the reverse commute, so that the understatement is not likely to be significant.

Before and after comparisons of vehicle productivities (riders/vehicle-hour) are given in Table 6.17 for SCRTD routes established prior to the project. As indicated, productivity dropped on all of these lines, with the greatest reduction occurring on Route 601. However, none of these lines made return trips before the Diamond Lanes were implemented. Productivity on Route 604 averaged 17.30 riders per vehicle-hour over the entire project, compared to 19.93 riders per vehicle-hour before the project.

Productivity measured as riders per vehicle-hour is constrained on long Freeway express routes, such as the Diamond Lane service. The reasons were, first, that few if any riders were carried in the reverse commute direction, so this portion of the run was spent unproductively dead-heading back to pick up another load of riders in the peak direction. Secondly, these routes were designed primarily to carry a specific type of rider; namely, the CBD worker living in the suburbs. These were fairly long trips with no intermediate stops. Hence, productivity was limited. Short trippers are were not served, as they were on the heavy intra-urban lines which attained much higher productivities.

None of SCRTD's freeway routes, including the San Bernardino Busway, averaged more than 40 riders per vehicle-hour. The most productive route was the San Diego Freeway Flier, averaging 38 riders per hour. Line 496 on the San Bernardino Busway averaged 13.5 riders/ hour.

TABLE 6.17: DIAMOND LANE TRANSIT PRODUCTIVITY*

(Riders/Vehicle Hour)

ROUTE	BEFORE ◆ LANES	FIRST WEEK	FINAL WEEK	PROJECT AVERAGE/ DAY	PROJECT MINIMUM/ DAY	PROJECT MAXIMUM/ DAY
SCRTD 601	16.10	4.43	6.61	6.32	3.00	11.67
SCRTD 604	19.93	20.98	14.20	17.30	11.43	23.12
SCRTD 605	15.75	11.64	12.46	11.88	9.64	15.11
SCRTD 606	13.72	9.93	11.39	10.27	5.38	13.94
ALL OLD	14.68	10.19	9.46	9.58	5.92	11.39
SCRTD 602	--	3.61	10.86	7.15	1.74	11.41
SCRTD 603	--	1.24	--	2.25	1.04	5.79
SCRTD 607	--	5.19	10.09	9.51	3.46	13.94
SCRTD 608	--	--	4.72	6.41	3.15	11.66
ALL NEW		3.13	7.76	5.62	1.95	7.93
PAR 708	--	12.59	11.08	9.72	4.74	16.56
PAR 746	--	2.89	6.67	5.90	2.55	12.44
PAR 774	--	1.84	--	1.81	1.21	2.72
ALL PAR	--	3.42	7.50	5.32	2.48	9.17
SCRTD	14.68	6.12	8.59	7.18	4.09	8.92
SMMBL	--	10.38	18.36	16.56	7.69	22.11
ALL	14.68	6.67	10.11	8.42	4.78	10.78

*During peak hours in the peak direction of travel only.

Many of the heavy urban lines carried more than 75 riders per hour. For example, the most productive route in the entire SCRTD system was Line 41, running on Alvarado Street, with a productivity of 101 riders per vehicle-hour.

The average Diamond Lane cost per passenger of $3.49 for SCRTD was more than five times the systemwide average of $.61. This high cost per passenger may be traced to the extremely low productivity of 7.20 passengers per vehicle-hour, as compared to the systemwide average of 44.3 passengers per vehicle-hour. The average cost per rider for the entire project period masked the downward trend over time, which is shown graphically in Exhibit 6.13. The average SCRTD cost per passenger declined from $4.00 during the initial weeks to $2.50 near the end of the project, as unproductive runs were eliminated.

The average cost per SMMBL rider was $1.52. This is 56% lower than SCRTD due to higher occupancy rates and lower operating costs per vehicle-mile. By the end of the demonstration, SMMBL costs were $1.40 per rider.

Over the entire Diamond Lane project period, the average revenue per rider for SCRTD was $.46. This was composed of both cash-paying riders and monthly pass riders. This resulted in an average deficit or subsidy of $3.03 per rider. SMMBL, with lower operating costs and an average revenue of $.44/passenger, managed an average deficit of $1.08/ passenger.

The cost per passenger for different groups of SCRTD routes is plotted over time in Exhibit 6.14. As shown, per-rider costs were lowest and nearly constant on old SCRTD routes. The average cost over the entire project period was $2.60/rider on these routes, with a standard deviation of $.35 and a minimum of $2.15/rider.

Costs were 87% higher on new routes, averaging $4.86/passenger. As shown in Exhibit 6.14, the cost on these lines averaged $9.67/ rider during the first project week and declined steadily to $2.87/ rider during the 21st week. As service cutbacks were continued on unproductive lines, it is likely that these costs would have declined further as the project continued.

Park-and-Ride costs per passenger were lower initially, but ended higher than on the new routes. The average over the entire project on these routes was $5.02/rider, with a maximum of $7.50 and a minimum of $2.87. Costs reached a minimum during the 16th week and then began to climb, with a drop in ridership following the SCRTD fare increase on July 1. Since the fares were highest on the Park-and-Ride routes, these riders received the greatest absolute fare increases for their trips and appeared to defect in greater numbers following the fare increase than riders of other SCRTD routes.

EXHIBIT 6.13

TRANSIT OPERATING COST PER PASSENGER ON SANTA MONICA FREEWAY ROUTES

IN THE PEAK DIRECTION OF TRAVEL ONLY

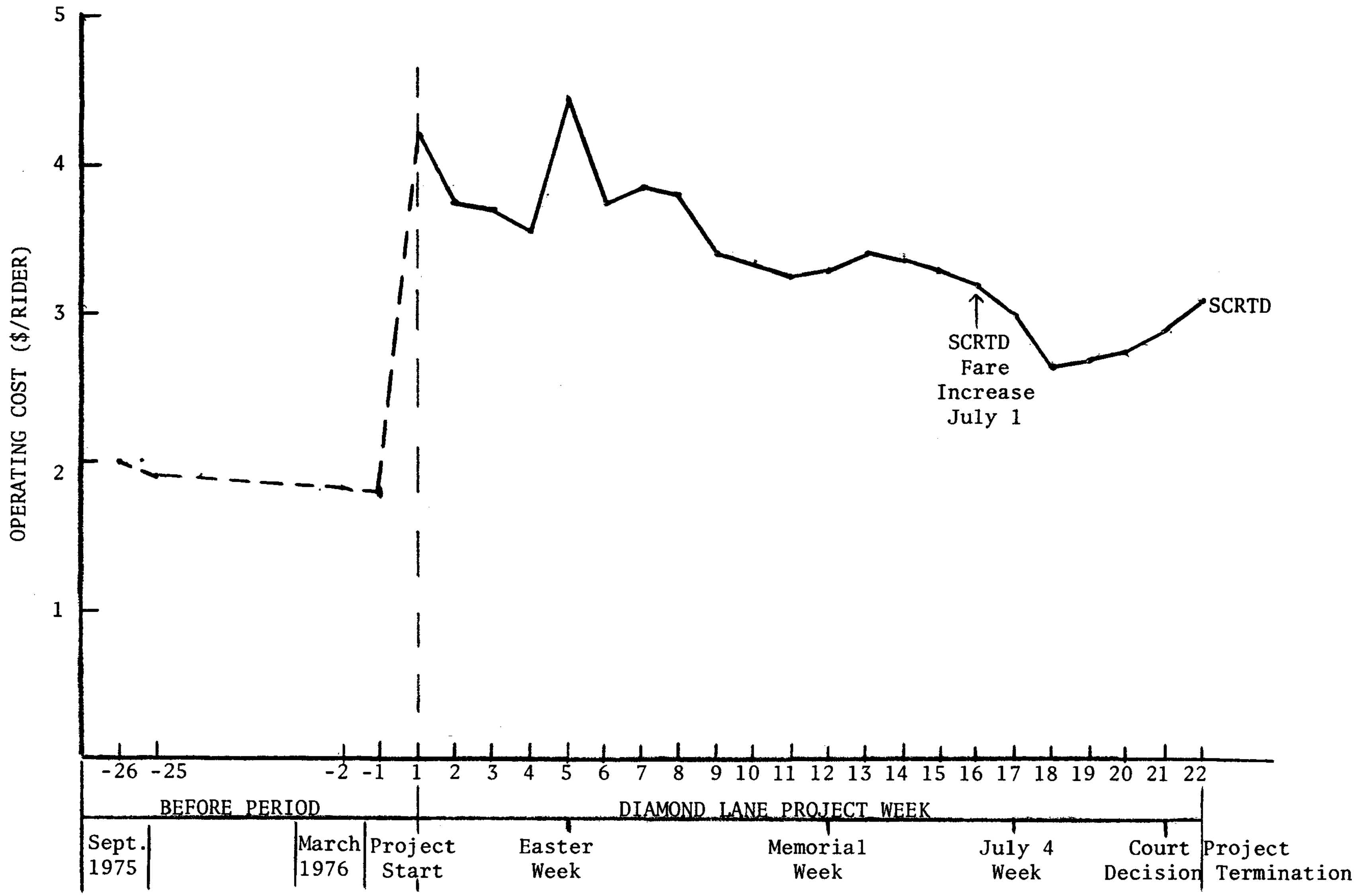
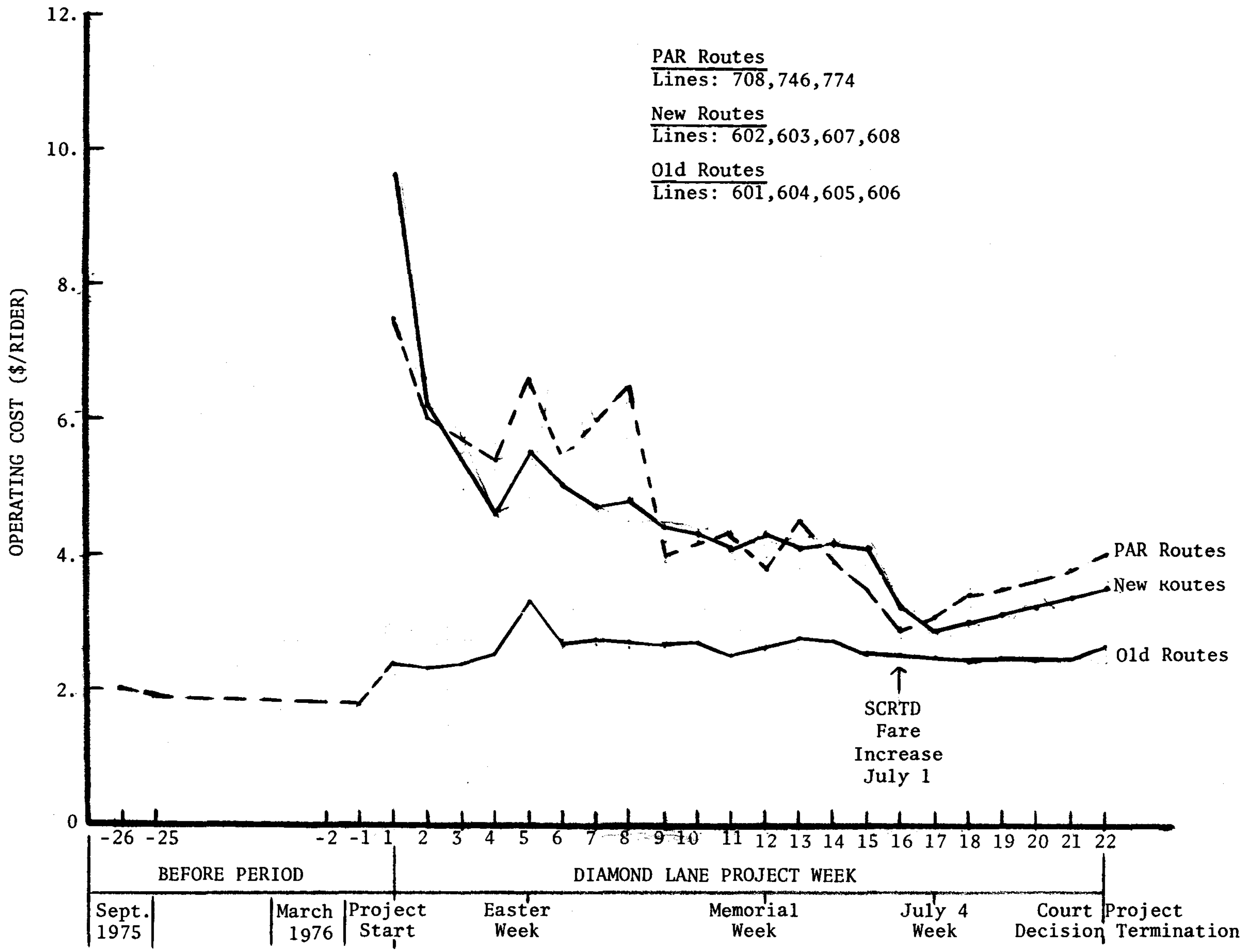


EXHIBIT 6.1.4

SCRTD TRANSIT OPERATING COST PER PASSENGER ON DIFFERENT GROUPS OF SANTA MONICA FREEWAY ROUTES IN THE PEAK DIRECTION OF TRAVEL ONLY



To place these seemingly high costs per passenger in perspective, they should be compared with the cost of making a similar trip by automobile. Estimates of the cost of owning and operating an automobile were reported recently in a nationwide study conducted by the Federal Highway Administration.* These cost estimates are listed below for three different automobile sizes along with the percent of drivers in the Santa Monica Freeway corridor falling into each category:

Car Size	Cost/Mile* (Excluding Parking and Tolls; Cents)	Santa Monica Freeway Survey Respondents
Standard	15.7	55%
Compact	12.5	32%
Subcompact	10.5	13%

(Weighted Average Auto Cost for the Santa Monica Freeway Corridor = 14.0¢/mile)

This mix of vehicles was obtained from the Santa Monica Freeway Corridor Driver Survey and was used to compute a composite auto operating cost of 14.0¢/mile for the corridor. This cost excludes parking charges. A recent study** of downtown Los Angeles travel patterns showed the average cost of parking in the CBD to be $1.49 per day.

To compute average automobile trip costs that are comparable to the bus costs reported above, a representative sample of trip origins was selected from the area served by the Diamond Lane bus routes. The distances were measured for trips from these origins to the CBD via the Santa Monica Freeway. These are the same trips that were used to compute travel times in Chapter 5. The automobile costs were then computed for these trips assuming an average occupancy rate of 1.29 people per car, a cost of 14¢ per mile, and a half-day parking charge of 74.5¢. The results are tabulated in Table 6.18. The costs range from $2.63/person for a long trip from Sunset and Swathmore in West Los Angeles to the CBD and $1.16/person for a short trip from Crenshaw and Adams to the CBD. These are slightly lower than the average SCRTD cost per bus passenger of $2.50 near the end of the project, and generally higher than SMMBL costs, which were $1.40 per rider by the end of the demonstration.

6.5 POSTSCRIPT

Most of the bus routes operating at the close of the Diamond Lane operation continue to operate on the Santa Monica Freeway. Only the Park-and-Ride lines have been discontinued. It was ori-

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*"Cost of Owning and Operating an Automobile, 1976," U.S. Department of Transportation, Federal Highway Administration.

**Wilbur Smith and Associates, "Downtown Los Angeles Travel Surveys," prepared for the Southern California Rapid Transit District, Los Angeles, California, July 1975.

TABLE 6.18

AVERAGE AUTO COSTS FOR A REPRESENTATIVE SAMPLE

OF CBD-DESTINED TRIPS*

IN THE SANTA MONICA FREEWAY CORRIDOR

TRIP ORIGIN	DISTANCE (Miles)	COST/RIDER** ($)
Sunset & Swathmore	18.90	2.63
Bundy & San Vicente	15.05	2.21
20th & Montana	14.39	2.14
14th & Santa Monica	14.04	2.10
17th & Pico	13.53	2.05
Inglewood & Venice	11.32	1.81
Marina & Andmiralty	11.04	1.78
Culver & Vista Del Mar	14.50	2.15
79th & La Tijera	13.45	2.04
Jefferson & La Cienega	8.48	1.50
Ainodrome & La Cienega	8.48	1.50
Robertson & Burton Way	10.61	1.73
Motor & Manning	9.90	1.65
Crenshaw & Adams	5.35	1.16

* For trips from the origin shown to 8th and Flower in Downtown Los Angeles via the Santa Monica Freeway.

** Based on an average auto occupancy of 1.29 people/car and a cost of $.14/mile, and a half-day parking charge of $.745.

ginally hoped that a comparison of post-project ridership levels attained during Diamond Lane operating hours would shed some light on the relative contribution of the lane itself to bus ridership. Unfortunately, just two weeks after Judge Byrne announced his decision to open the Diamond Lanes to general traffic, SCRTD drivers went on strike, shutting down all system operations for five weeks. In examining current ridership levels, therefore, it is virtually impossible to separate the effects of the transit service shutdown from the effects of the Diamond Lane shutdown on transit patronage in the Santa Monica Freeway corridor. Even SMMBL Route 10, the one Diamond Lane route which was not shut down by striking drivers, was affected by the strike, since patronage levels on this one remaining line reached new heights as riders left stranded by SCRTD transferred to the SMMBL line.

Table 6.19 compares ridership levels following the resumption of SCRTD service with levels before, during, and at the close of Diamond Lane operations. This table shows that the number of riders per day on SCRTD routes in existence prior to the Diamond Lane demonstration dropped 20% between the close of Diamond Lane operations and December 9, 1976, a period that included the five-week bus strike. The interpretation of this decline is further complicated by the fact that SCRTD cut service frequencies on many old routes during the same period, so that the number of riders per trip actually increased by 4% when compared with peak levels during the demonstration.

Ridership declines were more pronounced on new SCRTD routes which had little chance to build a firm ridership base before the close of the Diamond Lanes and the onset of the strike. Average daily ridership on these routes dropped 28% between the close of the Diamond Lanes and the post-project measurements of December 9. Over this same period, the number of riders per trip on these same new routes dropped by only 17%. Again, the difference between the drop in absolute ridership and the decline in the number of riders per trip reflects a decline in service frequencies.

On SMMBL Route 10, which continued operating through the SCRTD strike, ridership levels seven months after the close of the Diamond Lane operations were within four percent of the levels at that time. Ridership on this line had peaked during the last days of the SCRTD strike, when Route 10 carried 54% more peak-period passengers than it had during the height of Diamond Lane operations. During the two weeks following the Diamond Lane shutdown, but before the SCRTD strike, ridership on Route 10 had dropped 9% below the 1,075 riders per day carried during the last week of Diamond Lane operations. Some portion of this decline could also be attributed to the SMMBL fare increase, which was instituted one week prior to Judge Byrne's ruling. Although the influence of the fare increase and the SCRTD strike makes it difficult to trace the precise impact of the Diamond Lane's shutdown on Route 10 ridership, the combinations of events appears to have had little adverse effect on the patronage of this popular route, which remains at high levels.

TABLE 6.19: POST-PROJECT BUS RIDERSHIP BY ROUTE

LINE	AVERAGE RIDERSHIP									
	Riders Per Day					Riders Per Day				
	Before	During	21st Week	After*	% Increase or (Decline) from 21st Wk.	Before	During	21st Week	After*	% Increase or (Decline) from 21st Wk.
OLD SCRTD ROUTES										
601	51	101	94	41	(-56%)	26	15	16	10	(-38%)
604	731	776	747	691	(-7%)	37	32	29	31	+ 7%
605	271	306	370	207	(-44%)	28	22	26	23	(-12%)
605	169	244	296	264	(-11%)	24	19	25	26	+ 4%
Subtotals Old Routes	1175	1427	1507	1203	(-20%)	32	25	26	27	+ 4%
NEW SCRTD ROUTES	--	237	347	243	(-30%)	--	20	29	27	(- 7%)
602	--	237	347	243	(-30%)	--	20	29	27	(- 7%)
607	--	321	453	345	(-24%)	--	21	30	27	(-10%)
608	--	137	143	94	(-34%)	--	23	24	16	(-34%)
Subtotals New SCRTD Routes		695	943	682	(-28%)	--	21	29	24	(-17%)
SMMBL Line 10	--	870	1075	1031	(- 4%)	--	41	43	38	(-12%)
TOTALS	1175	2992	3525	2916	(-17%)	32	29	32	29	(- 9%)
Discontinued SCRTD Routes										
603	--	56	X	X		--	8	X	X	
708	--	207	155	X		--	15	16	X	
746	--	144	115	X		--	10	12	X	
774	--	60	X	X		--	4	X	X	

*Post-project measurements were made December 9, 1976 on SCRTD routes and March 10, 1977 on SMMBL Route 10. Comparisons of post-project ridership levels with levels recorded during Diamond Lane operations are clouded by the five-week strike which shut down all SCRTD operations between August 23 and September 28.

Table 6.19 shows that, in the aggregate, ridership levels on all Santa Monica Freeway express routes still in operation in early 1977 were roughly 17 percent below the peak achieved during the last week of Diamond Lane service. When cutbacks in service frequency are accounted for, the number of riders per trip is only nine percent below Diamond Lane levels. In general, ridership drops were most severe on those routes (601, 605, 607, and 608) reporting the longest door-to-door travel times in the on-board survey. That is, ridership declines were greatest on the longer trips where the Diamond Lanes offered the greatest opportunity for time savings.

A number of exogeneous influences combine to frustrate attempts to isolate the impact of the Diamond Lanes themselves on bus ridership. These include the short life of the project, seasonal patronage variations, the media blitz, frequent and major changes in bus service frequency, fare increases, and a five-week strike. As one project participant put it, "...if one were to purposely devise a situation to frustrate an evaluation consultant, this would be it."*

It is tempting to use these adverse influences as an argument that the extent of the Diamond Lane's influence on bus ridership can at least be bounded by surviving ridership levels. If, in the face of service cutbacks, fare increases, and a five-week strike, subsequent ridership levels have still managed to rise to within 17 percent of their peak during Diamond Lane operations, it seems that the Diamond Lane itself could not have been responsible for attracting any more ridership than is contained in this 17 percent figure or, roughly, 600 riders per day. Such a conclusion must immediately be tempered by the observation that the Diamond Lane's influence was proportionally greater on newer, longer SCRTD routes than on shorter, well-established routes, and the caveat that the extent of the Lane's influence on bus ridership will always be clouded by the short duration of the demonstration and the media hullabaloo surrounding the project, which both advertised the existence of bus service and threatened the permanence of the reserved right-of-way used by the service.

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*Letter from Pat Conway of SCRTD to John Billheimer, March 2, 1977.

CHAPTER 6 REFERENCES

1. Application to the Urban Mass Transportation Administration for a Demonstration Grant, Santa Monica Freeway Preferential Lane Project, prepared by California State Department of Transportation, City of Santa Monica, and Southern California Rapid Transit District, April 1975.

2. Southern California Rapid Transit District Departmental Memorandum, History and Current Status of Santa Monica Freeway Diamond Lane Project, from Jim Holzer to Pat Conway, July 1, 1976.

3. Southern California Rapid Transit District Departmental Memorandum, Results of August 5, 1976 Diamond Lane Bus Operators Survey, from G.L. McDonald to Pat Conway, August 25, 1976.

4. Southern California Rapid Transit District Departmental Memorandum, Effect of Premium Fare on Expected Patronage: Santa Monica Freeway Preferential Lane Project, from George L. McDonald to Gerald L. Squier, June 4, 1975.

5. Southern California Rapid Transit District Departmental Memorandum, New Services Cost Formula for FY 76, from Howard Beardsley to J.B. Scatchard, February 10, 1976.

6. Southern California Rapid Transit District, Statistical Digest and Patronage Report, June 1976.

7. Evaluation of Three-Month Trial 25¢ Flat Fare in Los Angeles County, Final Report, a multi-agency report prepared by K.E. Weary, J.E. Kenan, D.K. Eoff, July 1974.

8. Southern California Rapid Transit District, Downtown Los Angeles Travel Surveys, published by Wilbur Smith and Associates, April 1975 (revised July 1975).

9. Letter from Pat Conway of SCRTD to John Billheimer of SYSTAN, March 2, 1977.

SECTION 4

SAFETY, THE ENVIRONMENT, AND PUBLIC RESPONSE

SAFETY AND ENFORCEMENT (CHAPTER 7)

ENERGY CONSUMPTION AND AIR QUALITY
(CHAPTER 8)

WHAT HAPPENED OFF THE FREEWAY
(CHAPTER 9)

7.0 SAFETY AND ENFORCEMENT

This section examines accident levels on the Santa Monica Freeway and on surface streets before and after the implementation of the Diamond Lane project. A variety of statistical tabulations and correlations are presented in an attempt to explore the underlying causes of post-implementation freeway accidents. Police deployment levels are recorded and compared with the observed frequency of Diamond Lane violations and with the number of citations issued for these violations.

7.1 FREEWAY ACCIDENTS

7.1.1 Trends Over Time

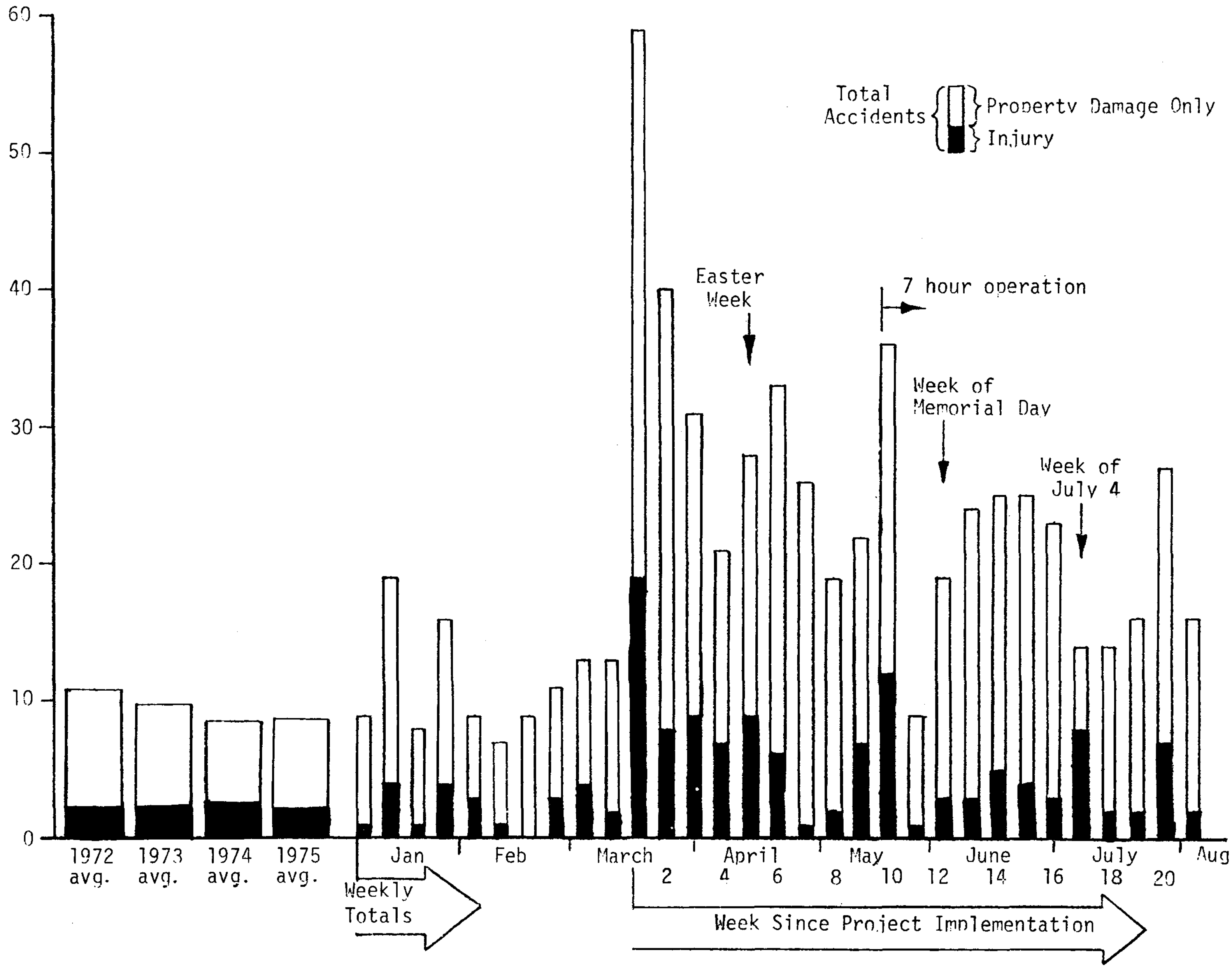
Since the first week of operation, when fifty-nine accidents were reported during Diamond Lane operating hours, the total number of reported accidents dropped substantially, with an average of eighteen accidents per week occurring during the last month of the project. Throughout the 21 weeks of the project, 527 accidents were reported during peak operating hours for an average of 25 accidents per week. This number is significantly higher than the average rate experienced prior to project implementation. Exhibit 7.1 plots the average number of accidents occurring per week during the years 1972 through 1975, along with a week-by-week summary of accident levels during the first seven months of 1976. The average number of accidents occurring per week during the peak morning and evening hours on the Santa Monica Freeway dropped from 10.8 in 1972 to a low of 8.5 in 1974, the year of the severe gasoline crisis. Weekly accidents rose slightly in 1975 to a level of 8.7 accidents per week, and the average level experienced during the first two and one-half months of 1976 was 11.4 accidents per week.* Thus, the level of accidents on the Santa Monica Freeway during the Diamond Lane operating hours was more than double the rate experienced during the period immediately preceding the project, and more than two and one-half times the average rate experienced during the four years preceding 1976.

7.1.2 Categories of Accident Severity

The three major categories of freeway accidents are (1) fatal, (2) injury, and (3) property damage only (PDO). Historically, few fatal accidents have occurred on the Santa Monica Freeway during peak operating hours -- an average of one per year

*The quoted accident rates prior to project implementation cover the hours between 6:00-10:00 AM and 3:00-7:00 P.M., the original project operating hours. When the revised morning hours of 6:30-9:30 AM are considered, the average accident level during the four years preceding the project was 8.9 per week.

EXHIBIT 7.1: HISTORY OF FREEWAY ACCIDENTS DURING PEAK OPERATING HOURS



during the four years between 1972 and 1976 -- and no fatalities occurred during the implementation of the Diamond Lane project. During the four years prior to the project, an average of 2.3 injury accidents per week were reported during the peak morning and evening hours. Nineteen injury accidents were reported during the first week of project operation. Throughout the length of the project, an average of 5.7 injury accidents were reported per week during operating hours. Although this figure marks a substantial decline from the level reported during the first weeks of operation, it remains nearly two and one-half times as high as the pre-project average.

Injury accidents may be further divided into three subcategories: (1) severe, (2) visible injuries, and (3) complaint of pain. In 1975, three percent of the injury accidents on the Santa Monica Freeway were reported as severe, 39 percent as entailing visible injuries, and 58 percent as resulting in complaint of pain. Data for the twenty-one week duration of the project show that only one severe accident (slightly less than one percent of all injury accidents) had occurred, while the number of visible injury accidents dropped slightly to 38 percent and the complaint-of-pain accidents increased to 61 percent of the total. Although these figures show a slight decline in the relative severity of injury accidents, no statistical significance can be attached to this decline; that is, on the basis of the available data, statistical tests* give no basis for concluding that the Diamond Lanes affected the relative severity of injury accidents on the Santa Monica Freeway.

Accidents classified as property damage only (PDO) also increased markedly during the implementation of the Diamond Lane project. During the four years preceding the project, an average of 7.2 PDO accidents were reported per week during the peak morning and evening hours. This average has been increasing since the gasoline crisis of 1974, and stood at 9.1 PDO accidents per week during the first two and one-half months of 1976. During the first week of Diamond Lane operation, the number of PDO accidents jumped to 40. Throughout the project, an average of 19.4 PDO accidents were reported per week. Although this average represents a significant improvement over early project experience, it remains more than twice the average level reported prior to project initiation.

7.1.3 Trends Per Million Vehicle-Miles

Since accidents on the Santa Monica Freeway increased at the same time that vehicle mileage decreased, the measured increases in accident levels are even more striking when considered in the light of the common index, accidents per million vehicle-miles (MVM).

*The χ^2 test for the similarity of samples, conducted at a significance level of .05.

TABLE 7.1

ACCIDENTS PER MILLION VEHICLE-MILES FOR SANTA MONICA FREEWAY DIAMOND LANE PROJECT

(Project Data for 7-Hour Period: 6:30-9:30 AM and 3:00-7:00 PM)

Week	Number of Accidents			Weekly (5 Days) Vehicle-Miles	PDO Accidents/ MVM	Injury Accidents/ MVM	Total Accidents MVM
	PDO	Injury	Total				
Pre-◇ Lane	6.15	2.45	8.60[1]	6,123,400[3]	1.00	0.40	1.40
1	36	8	54[2]	3,963,475	9.08	4.54	13.62
2	29	8	37	4,191,110	6.92	1.91	8.83
3	21	8	29	4,282,170	4.90	1.87	6.77
4	14	6	20	4,269,160	3.28	1.40	4.68
5	19	9	28	4,349,800	4.37	2.07	6.44
6	26	6	32	4,430,110	5.87	1.35	7.22
7	25	1	26	4,973,285	5.03	0.20	5.23
8	15	2	17	4,972,580	3.02	0.40	3.42
9	14	6	20	5,140,955	2.72	1.17	3.89
10	24	12	36	4,679,640	5.13	2.56	7.69
11	8	1	9	5,414,940	1.48	0.18	1.66
12	17	3	20	4,346,180	3.91	0.69	4.60
13	21	3	24	5,024,380	4.18	0.60	4.78
14	20	5	25	5,299,550	3.77	0.95	4.72
15	21	4	25	4,933,790	4.26	0.81	5.07
16	20	3	23	5,648,640	3.54	0.53	4.07
17	6	8	14	4,965,530	1.21	1.61	2.82
18	12	2	14	4,710,385	2.55	0.42	2.97
19	14	2	16	4,830,065	2.90	0.41	3.31
20	20	7	27	4,860,085	4.12	1.44	5.56
21	14	2	16	5,147,480	2.72	0.39	3.11
Total (21 Weeks)	396	116	512	100,433,310	3.94	1.16	5.10

[1] California Highway Patrol data for period from March 17-August 12, 1975 (1.72 accidents/day, eight-hour period).

[2] Data for Weeks 1-21 from "Evaluation Report on the Santa Monica Freeway Diamond Lane Project After 21 Weeks of Operation," CALTRANS, September 1976, Table K.

[3] Before data covers eight hours: 6:00-9:00 AM and 3:00-7:00 PM.

Table 7.1 shows that during the operation of the Diamond Lane project, the overall accident rate was 5.1 accidents/MVM. PDO accidents averaged 3.9 accidents/MVM, and injury accidents averaged 1.16 accidents/MVM. The overall accident rate during the Diamond Lane project period was 3.64 times the rate recorded during the same period of the previous year (March 17 to August 12, 1975). This overall rate is biased by the influence of unusually high accidents and unusually low vehicle volumes during the early weeks of the project. As the project progressed, accident levels dropped while vehicle volumes increased, bringing about a steady decline in the accidents/MVM measure, a decline that was still continuing as the project ended.

Accident rates on U.S. freeways in general and on California freeways in particular declined steadily in the years immediately prior to 1976. By 1975, accident rates on urban freeways in California had dropped to 0.98 accidents/MVM. The overall averages for the period 1971-1975 was 1.29 accidents/MVM, significantly higher than this 1975 level. During project operating hours between March and August 1975, the year preceding the Diamond Lane demonstration, the Santa Monica Freeway accident rate was 1.40 accidents/MVM, 43% higher than the average rate for all California freeways. Table 7.2 provides a comparison of accident rates on the Santa Monica Freeway, California urban freeways, and all U.S. urban freeways.

7.1.4 Categories of Collision

Accidents may also be classified according to the type of collision. Potential collision categories are listed below:

- Head-on;
- Sideswipe;
- Read-end;
- Broadside;
- Hit object; and
- Other.

During the Diamond Lane demonstration, rear-end collisions accounted for 80 percent of the accidents recorded during project operating hours. By way of comparison, rear-end collisions accounted for only 68 percent of all accidents recorded on the Freeway during a similar time period in 1975. Thus, the relative incidence of rear-end collisions increased significantly during project implementation. To the extent that this relative increase may reflect changing Freeway conditions, it is worth noting the circumstances under which such accidents occur. As itemized by CALTRANS, "typically, rear-end type accidents occur during periods of heavy

TABLE 7.2: A COMPARISON OF

ACCIDENTS PER MILLION VEHICLE-MILES ON URBAN FREEWAYS

	ACCIDENTS				
	PDO/ MVM	INJURY AND FATAL			
		INJURY/MVM	FATAL/MVM	INJ+FATAL/MVM	TOTAL MVM
California Urban Freeways 1975	0.70	0.29	0.0079	0.30	0.98
All U.S. Urban Freeways, 1975	N.A.*	0.79	0.0122	0.80	N.A.*
Santa Monica Freeway March-August, 1975	1.00	0.40	0	0.40	1.40
Santa Monica Diamond Lane Project, 1976	3.94	1.16	0	1.16	5.10

* N.A.: Not available.

Sources: Caltrans, 1975 Accident Data on California State Highways, prepared in cooperation with U.S. Department of Transportation, FHWA, August, 1976; & U.S. Dept. of Transportation, FHWA, Fatal and Injury Accident Rates on Federal-Aid and Other Highway Systems, 1975.

flow, with short vehicle headways, relatively high speeds, accompanied by conditions which cause sudden or unexpected slowdowns or stopping" (Reference 7.1).

7.1.5 Timing, Direction and Location

Roughly two-thirds of the accidents reported during Diamond Lane operating hours occurred during the four evening hours. Prior to the shift from four morning operating hours to three, sixty-four percent of all accidents occurred during the evening peak. This dominance of the evening hours coincides with experience prior to the installation of the Diamond Lanes. During the four years preceding installation, 61 percent of all peak hour accidents occurred during the evening peak.

The easterly direction of travel shows a slightly higher percentage of accidents than the westerly direction, with 55 percent of all accidents occurring in eastbound lanes. Prior to implementation, 51 percent of all accidents occurred in the eastbound lanes. The preponderence of eastbound accidents is particularly striking on that portion of the Freeway west of La Cienega Boulevard. On this portion of the Freeway, approximately three-quarters of all accidents experienced since the opening of the Diamond Lanes occurred in the eastbound direction, or generally in the direction of increasing congestion. Prior to project implementation, only 52 percent of all accidents in this westerly sector occurred in the eastbound direction.

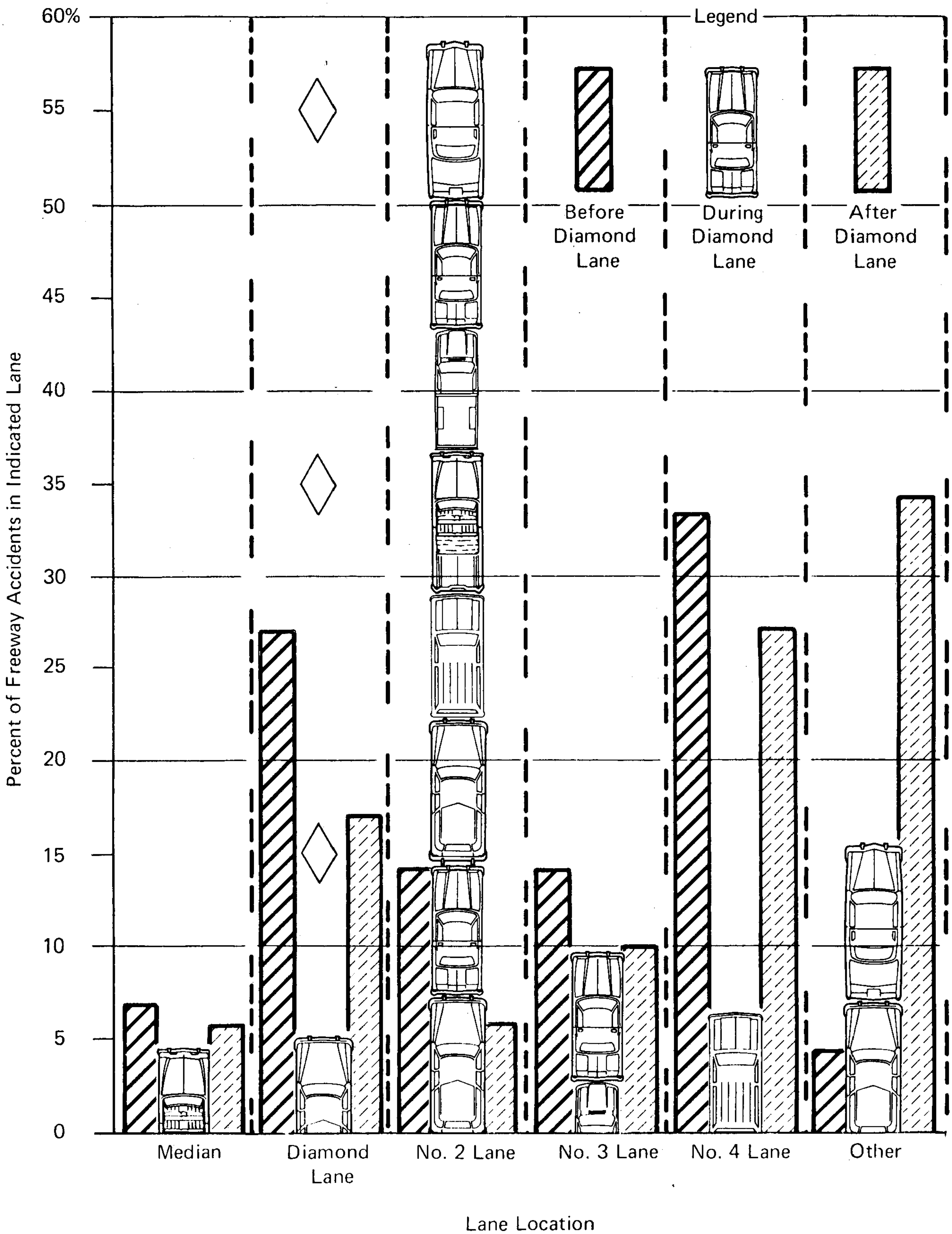
The greatest relative increase in accidents by time and direction occurred in the eastbound lanes during the evening rush-hours. For the corresponding 21-week period in 1975, 43 accidents occurred in these lanes during the evening peak. During the evening Diamond Lane operating hours, 178 accidents occurred in this off-peak direction, an increase of 314% over pre-project levels.

In addition to the absolute increases in the number of accidents occurring during project implementation, certain changes occurred in the relative pattern of accidents. Perhaps the most notable of these relative changes was the comparative increase in accidents in the lane adjacent to the Diamond Lane, the Number 2 lane of the Santa Monica Freeway. Exhibit 7.2 plots the relative percentage of accidents occurring in each lane before and after project implementation. During project implementation, 59 percent of all accidents occurring during Diamond Lane operating hours happened in the Number 2 lane. During a comparable period in 1975, the Number 2 lane accounted for an estimated 14.5 percent of all accidents, while the Number 1 lane -- operating as the left Freeway lane with no restrictions on its use -- accounted for 27 percent of all accidents.

In absolute terms, an average of 14.8 accidents per week occurred in the Number 2 lane during Diamond Lane operating hours. This represents an increase of over 13 accidents per week over pre-

EXHIBIT 7.2

RELATIVE ACCIDENT LOCATION BY LANE
BEFORE AND AFTER PROJECT IMPLEMENTATION



project levels for the Number 2 lane and more than 12 accidents per per week over pre-project levels in the Number 1 lane. Yet the net increase in accidents during project implementation appears to be roughly 13.7 accidents per week measured against the early months of 1976. (The increase is slightly higher if measured against earlier levels -- 15.6 accidents per week if measured relative to the average for the previous four years, and 16.3 if measured relative to a comparable period in 1975.) Thus, it is almost as if the entire increase in accidents has been concentrated in the Number 2 lane. This is an oversimplification, as some compensating changes have occurred in other lanes. In the Diamond Lanes, for example, accidents dropped from 2.7 per week to 1.3 per week, while traffic volumes in the lane dropped 72 percent.

Exhibits 7.3 and 7.4 show the relative location of accidents along the length of the Santa Monica Freeway before and after project implementation. In general, accidents occur more frequently near the eastern end of the Freeway, where traffic volumes are highest. This trend is particularly clear during the evening peak period, when most of the accidents occur. Prior to implementation, a high percentage of accidents during the morning peak period occurred west of the Western Avenue on-ramp, where traffic from the access road fed by Western, Normandie and Hoover Avenues and the Harbor Freeway entered the flow of traffic, and in the westbound lanes east of the San Diego Freeway exit ramp. Accidents during the evening peak period tended to cluster between the entrance ramp at Normandie Avenue and the exit ramp at Hoover Avenue.

During the project, accidents remained heaviest in the eastern portion of the Freeway. A high percentage of accidents still occurred in the morning peak west of the Western Avenue on-ramp (access road feeder), but the pre-project trouble spot east of the San Diego Freeway exit ramp no longer existed. However, another trouble spot developed in the eastbound lanes in the morning where traffic from the San Diego Freeway entered the flow of traffic. In the evening peak period, the percentage of westbound accidents occurring west of the Western Avenue access road on-ramp near Crenshaw Boulevard increased to about one-fourth of all westbound, evening peak accidents. This location, which had the highest percentage of westbound accidents in both the morning and evening peaks before the Diamond Lane demonstration, was particularly dangerous during the demonstration, as two heavily-used access lanes fed traffic into the Santa Monica Freeway.

7.1.6 Possible Causes

The increased level of accidents on the Santa Monica Freeway during the Diamond Lane demonstration was a source of concern to everyone associated with the project. As a result, the accident rate was the subject of investigation by CALTRANS engineers (Reference 7.1), the evaluation team (Reference 7.2), independent accident experts (Reference 7.3), and the California Highway Patrol

EXHIBIT 7.3
RELATIVE ACCIDENT LOCATIONS
PEAK MORNING HOURS

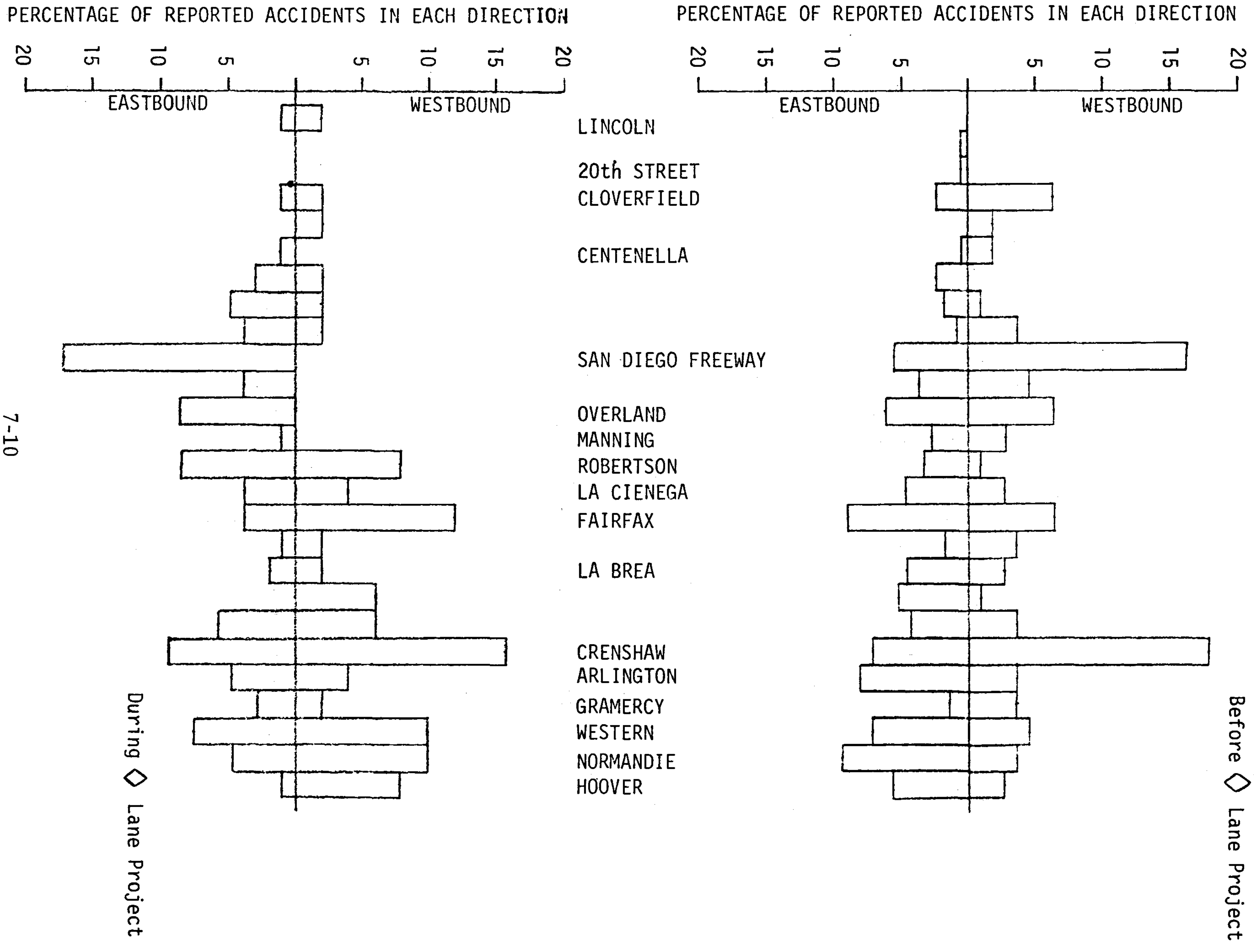
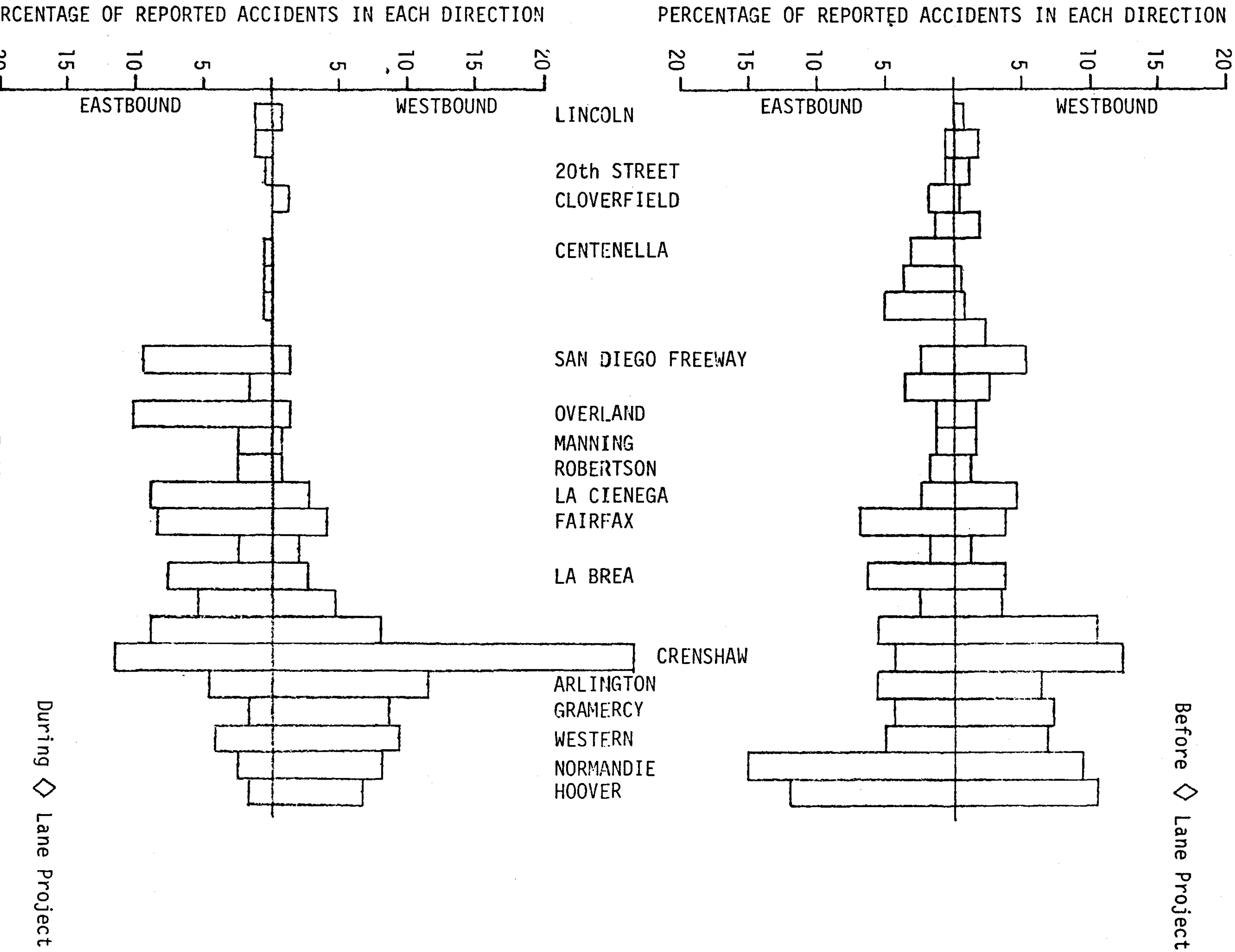


EXHIBIT 7.4
RELATIVE ACCIDENT LOCATIONS
PEAK EVENING HOURS



(Reference 7.4). These investigations led to the identification of a number of possible causes for the increased accident rate. These causes were related to a variety of factors, including increased CHP presence, increased congestion, the novelty of the Diamond Lanes, and the mechanics of Diamond Lane operation. The most prominent of these causes are listed below.

1. Hypotheses Related to CHP Presence:

   - The increased presence of the CHP on the Santa Monica Freeway means that minor accidents which previously would have gone unreported are written up.

   - The high ticketing rate resulting from CHP enforcement of Diamond Lane occupancy rules led to gawking and slowdowns, causing additional accidents.

2. Hypothesis Related to the Removal of an Existing Lane:

   - Accidents were a direct result of increased congestion resulting from lane dedication.

3. Hypotheses Related to Diamond Lane Operation:

   - Increased accidents were caused by unsafe lane changes resulting from both legal and illegal attempts to use the preferential lanes.

   - Motorists in Lane 2, accustomed to the relative absence of vehicles on their left in Lane 1, caused accidents by using the preferential lane as a safety valve to avoid rear-end collisions in their own lane.

   - The speed differential between Lane 2 and the faster adjacent lanes deluded the drivers in Lane 2 into believing they could travel faster than conditions in their lane allowed.

4. Hypotheses Related to Diamond Lane Novelty:

   - Driver confusion and experimentation in early weeks led to increased accident levels.

   - Movement in the preferential lane distracted drivers in the remaining lanes, causing accidents.

   - Driver aggravation with the Diamond Lane concept leds to reckless, aggressive driving.

5. Hypothesis Unrelated to Diamond Lane Implementation:

   - Accidents increased naturally as a result of increased freeway speeds and more relaxed attitudes toward energy consumption and 55 m.p.h. speed limit.

The remainder of this subsection discusses each of these groups of hypotheses in the light of accident statistics reported during the period of project implementation.

Hypothesis Group 1: Accidents were related to increased CHP deployment and enforcement levels. The increased presence of the CHP may have led to increased accident rates for either of two reasons:

A. Minor accidents that previously would have gone unreported were more likely to be reported if more CHP units were present.

B. Increased ticketing rates led to gawking and unexpected slowdowns, causing accidents.

Details of CHP personnel deployment and enforcement activities before and after project implementation appear in Section 7.3. During the first week of the project, personnel deployment levels on the Santa Monica Freeway were approximately double pre-project levels. This level was reduced gradually over the demonstration period, so that the average deployment level over the early weeks of the project was roughly 50 percent higher than normal. By the thirteenth week of the demonstration, the level of officer deployment approximated that experienced prior to the Diamond Lane project. The day-to-day variations in officer deployment and enforcement activities over the demonstration period, coupled with the day-to-day variations in accident levels, provide a basis for testing the above Hypotheses A and B.

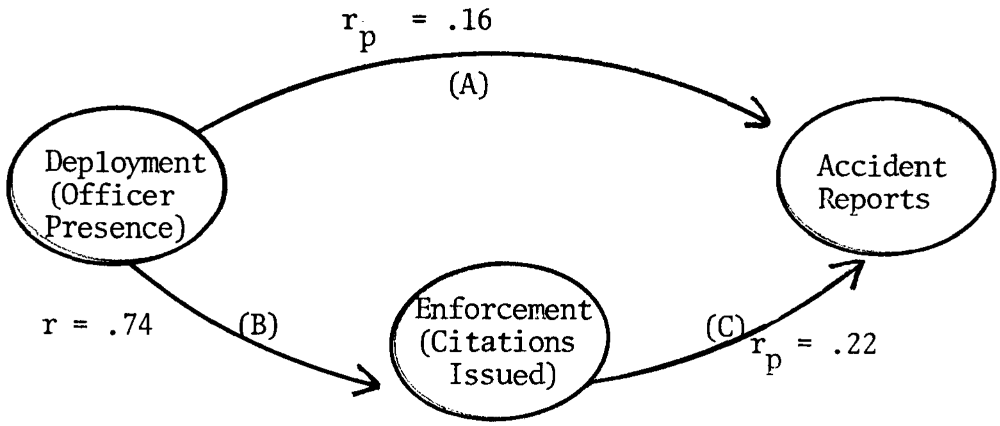
Under Hypothesis A, many minor accidents which previously went unreported would be reported during periods of increased CHP deployment. A recent report of the CHP (Reference 7.5) lends credence to the hypothesis that the reporting of PDO accidents is correlated with officer presence. According to this study, "....counts of minor property accidents are dependent upon the number of officers available for investigation and not on the number of accidents actually occurring" (Reference 7.5). On the basis of empirical data, the study further estimates that if officer presence is increased by 100%, the reporting of PDO accidents is likely to increase by 20 to 30 percent. By the end of the 12th week of the project, police deployment had been reduced to a level approximating that prior to the project. A comparison of PDO accident levels during the period of increased enforcement with similar levels following the 12th project week shows that a 24% reduction in PDO accidents accompanied the return to normal deployment levels, a reduction in force amounting to 35% of the deployment during the early project weeks. Because the period of higher enforcement coincided with the high-accident period following start-up, however, this decline is hardly conclusive evidence that the presence of the CHP created additional accident reports by overreporting PDO accidents. Furthermore, the level of PDO accidents experienced once the level of deployment had returned to normal remained more than double that experienced prior to the project.

Another means of testing the hypothesis that some portion of the observed accident increase represents an increase in reporting rather than an increase in accidents is to compare the relative increase in serious (injury) accidents with the relative increase in more minor (PDO) accidents. Using the four years prior to the project as a base, such a comparison shows that whereas PDO accidents increased by a factor of 2.7 following project implementation, injury accidents increased by a nearly comparable factor of 2.5. Moreover, the ratio of PDO accidents to injury accidents actually increased during the period following the reduction in CHP deployment. Thus, a comparison of the relative increases in major and minor accidents appears to provide little support for the hypothesis that minor accidents were overreported.

In an attempt to discover the extent to which increased CHP deployment and enforcement levels were related to observed accident increases, day-by-day correlations of accidents with both deployment and enforcement levels were undertaken for the period following the implementation of the Diamond Lane project. Correlation coefficients were computed for the months of Diamond Lane operation for both morning and evening operations and for those portions of the freeway on either side of La Cienega Boulevard. Coefficients were computed for each of the three relationships below:

	Dependent Variable	Independent Variable(s)	Correlation Coefficients r	r^2	Significance Level
(A)	Accidents with	Deployment	.329	.108	.001
(B)	Enforcement with	Deployment	.743	.553	.001
(C)	Accidents with	Enforcement	.345	.119	.001
	Accidents with Deployment and Enforcement (regression model; multiple r-r^2)		.361	.131	.001

As expected, enforcement levels were highly correlated with deployment levels and, consequently, enforcement and deployment levels had about the same degree of correlation with accident levels. All relationships were found to be significant at the .001 level, although only about 13% of the variation in accident levels is explained by the two variables. In order to differentiate the effects of enforcement and deployment, a path analysis for the following causal model was investigated under the assumption that in the short run, deployment levels will influence enforcement levels but not vice-versa:



$^*r_p$ = partial correlation coefficient

Under relationship (A), it is assumed that increased deployment causes accidents to increase only insofar as more accidents are reported; under relationship (B), increased deployment leads to increased citations, while under relationship (C), the gawking and slowdowns accompanying increased enforcement are assumed to lead to increased accident reports.

In the above diagram, the partial correlations are reported and suggest that of the initial .33 correlation between deployment and accidents, about half was due to relationship (A) and about half was due to relationship (C) mediated through relationship (B) (.16 + (.74).22 = .33). These results suggest that deployment and enforcement each had some small effect on accident levels, but are inconclusive for determining which effects were greater. The very strong correlation between deployment and enforcement levels makes it difficult to separate the effects mathematically. In the light of the observed increases in both major and minor accidents, however, and the continued high level of accidents once deployment had returned to normal, it appears that any effect of increased CHP presence on Santa Monica Freeway accident levels was more likely to be a result of their ticketing activities than a result of any tendency to overreport minor accidents. Moreover, although the effects of Diamond Lane deployment and enforcement levels were highly significant statistically (even when one or the other variable was controlled), they accounted for a relatively small portion of the observed variation in accident levels.

The correlation results listed above focus only on accident, deployment and enforcement levels <u>following</u> project implementation. It was felt that the inclusion of pre-implementation data would artificially strengthen the correlation and cloud the issue by implying a relationship between the three variables which could be coincidental. Furthermore, a day-by-day breakdown of enforcement activities during peak operating hours prior to project implementation was not readily available.

Prior to project implementation, accidents, deployment and enforcement levels were all relatively low. Following implementation, accidents increased markedly, decreased, and settled at more than twice pre-project levels. Deployment increased by a factor of approximately 50 percent during the early weeks of the project and returned to pre-project levels early in the month of June. Enforcement activities, however, increased dramatically with project implementation and continued at levels well in excess of pre-project experience. The number of citations and warnings issued for Diamond Lane and entry ramp violations immediately following project implementation was more than four times the estimated number of citations issued for other traffic violations prior to the project. By the close of the demonstration, the total number of enforcement contacts stemming from illegal use of the Diamond Lane and Freeway on-ramps remained more than double the estimated preproject level for all traffic violations.* Thus, the general pattern followed by enforcement activities before and during project implementation parallels the pattern of accidents. These similar patterns, consisting of a marked increase followed by a decline to a level more than double pre-project levels reinforces the hypothesis that enforcement activities could have contributed to the increased accident level. It is clear from air surveillance traffic reports and observation of Freeway operation (References 7.1 and 7.4) that Freeway traffic bunches up in areas in which tickets are being given. This bunching leads to stop-and-go conditions conducive to rear-end accidents.

Analysis suggests that it is unlikely that increased CHP presence on the Santa Monica Freeway led to any significant overreporting of accidents. It appears, however, that the distracting effect of the increased ticketing activities of the CHP may have accounted for some portion of the higher accident rate.

Hypothesis Group 2: Increased accidents are a direct result of increased congestion resulting from the denial of a lane to non-carpoolers. Exhibits 7.3 and 7.4 have plotted the relative frequency of occurrence of accidents along the length of the Santa Monica Freeway. A comparison of these accident locations with vehicle volumes along the Freeway reveal the not-unexpected finding that, in general, the heaviest accident locations are found where vehicle volumes are heaviest. The type of accident most prevalent following project implementation -- the rear-end collision in the Number 2 lane --would typically accompany increased congestion in that lane. Thus, the observed effects support the congestion hypothesis, although they also support many of the other proposed hypotheses as well.

No attempt has been made to correlate measured congestion by time of day with accidents occurring on that day. The difficulty

*Allocating reported citations on the basis of patrol man-hours, it is estimated that an average of 35 citations and warnings per day were issued for all violations prior to the project. During the project, an average of 151 citations and warnings were issued daily to drivers illegally using either the Diamond Lane or the on-ramp bypass lanes (see Section 7.3).

with this comparison is that accidents are all too frequently the cause of congestion, and hence will go hand-in-hand with measured congestion.

Although congestion undoubtedly contributed to the increased accident rate, three arguments make it seem unlikely that this factor is the primary cause of the marked increase in accidents:

A. Ramp meters were adjusted to minimize the effects of congestion and permit relatively unobstructed flow on the Freeway. Speed runs made in the eastbound direction showed that the adjustments to the metered access controls restored the non-preferential lanes to a condi tion of flow approximating that in existence prior to the initiation of ramp metering. Yet the average accident rate on the Freeway did not exceed ten accidents per week during the two years prior to the introduction of ramp metering. Congestion increases severe enough to double the accident rate should have been reflected in slower operating speeds.

B. In the early months of 1967, the portion of the Santa Monica Freeway between Arlington and La Brea Avenues was restriped to add a lane in each direction (Reference 7.6). The added capacity was accompanied by a reported accident drop of 10 percent, and a 15-percent decline in the accident rate per million vehicle-miles.

C. With the increase in carpool and bus ridership, and the concurrent shifting of some drivers to the city streets, the total number of vehicles per hour in each of the non-preferential lanes actually dropped slightly at several locations along the freeway (see Section 5.5).

Thus, if the demonstration project had simply taken one lane of the Freeway out of general use, it is unlikely that the marked increase in accidents would have occurred. However, the continued use of the reserved lane by traffic traveling at a significantly faster speed than the remaining lanes may have accounted for a significant portion of this increase. The possibility that the operation of the Diamond Lane itself, in conjunction with the increased congestion resulting from the creation of the lane, was a major cause of the accident increase is the subject of the third group of accident hypotheses.

Hypothesis Group 3: <u>Increased accidents may be traced to the barrier-free operation of the Diamond Lane at speeds well in excess of the speeds in other lanes.</u> The relative lack of vehicles in the Diamond Lane have made it possible for vehicles using the lane to travel at speeds well in excess of the speeds in other, more congested lanes. On the average, Diamond Lane vehicles traveled 12 miles per hour faster the the general freeway traffic. This speed differential is considerably higher than that experienced on other preferential lane projects having no separation between reserved and non-reserved lanes (see Section 10). Observers have proposed that this condition may have led to increased accidents for a number of reasons:

A. The speed differential makes safe lane changes more difficult to achieve. Motorists attempting to enter the Diamond Lane must enter a faster traffic stream from a lower starting speed, while motorists attempting to leave the lane must slow and attempt to find an opening in slower-moving traffic.

B. The ability to save time by using the Diamond Lane attracts violators who dodge in and out of the lane unsafely, attempting to stay one jump ahead of the CHP.

C. Motorists in Lane 2, accustomed to the relative absence of vehicles on their left in the Diamond Lane, cause accidents by using the preferential lane as a safety valve to avoid rear-enders in their own lane.

D. The speed differential between the Number 2 lane and the faster adjacent lanes deludes the drivers in the Number 2 lane into believing they can travel faster than conditions in their lane allow. Further, since traffic conditions are different in adjacent lanes, motorists receive no cues from these lanes to indicate how conditions in their own lane are changing.

The most promising sources of information regarding the relative likelihood of the accident causes postulated above are the individual accident reports filed by CHP officers. Examination of these reports provides several insights into the relative incidence of these postulated causes.

The difficulty of changing lanes safely has often been cited (References 7.1, 7.2 and 7.4) as a dangerous aspect of Diamond Lane operation. Table 7.3 itemizes vehicle movements prior to collision for all vehicles involved in accidents during the period of Diamond Lane operation and during a similar period one year earlier. Comparison of these movements shows that the relative percentage of accidents in which at least one of the vehicles was changing lanes remained roughly the same before and during Diamond Lane operation. During Diamond Lane operation, 9 percent of all vehicles were changing lanes prior to the collision, while the corresponding percentage during a comparable period in 1975 was 9.3 percent.

Although the absolute number of lane-changing accidents increased markedly during Diamond Lane operation, the increase in other types of accidents was just as great or greater. Significant changes were noted in the relative percentage of accidents in which the vehicles involved were slowing, stopping or standing still prior to collision. These increases reflect the increased incidence of rear-enders in the Number 2 lane and the increased level of stop-and-go traffic in all non-preferential lanes.

Attempts to verify the relative importance of unsafe lane changes as a cause of accidents by tabulating the actions of col-

TABLE 7.3

VEHICLE MOVEMENT PRIOR TO COLLISION

Movement	Before Diamond Lane (Mar. 17-Aug. 12, 1975)		After Diamond Lane (Mar. 15-Aug. 9, 1976)	
	Number	Percent	Number	Percent
Stopped	68	20.5	221	25.3
Proceeded Straight	114	34.3	245	28.1
Ran Off Road	13	3.9	44	5.0
Slowing, Stopping	83	25.0	265	30.4
Changing Lanes	31	9.3	79	9.0
Others	23	7.0	19	2.2
Total	332	100.0	873	100.0

liding vehicles involved in the accident tend to be inconclusive. It is not uncommon for a vehicle changing lanes unsafely in congested conditions to escape unscathed while leaving a wave of braking vehicles in its wake that culminates in a rear-end collision well removed from the scene of the initial lane change. In such a case, the drivers involved in the collision are generally aware only of the proximate cause of their accident, and the accident report fails to record the lane change that initiated the chain reaction. Thus, although unsafe lane changes in and out of the Diamond Lane might seem to provide a plausible explanation for the observed increase in rear-end collisions in Lane 2, it is impossible to verify this explanation through a study of individual accident reports.

Early in the Diamond Lane demonstration, CHP officers noted that a few accidents were caused by violators dodging in and out of the preferential lane, attempting to stay one jump ahead of a ticket (Reference 7.4). Examination of the 51 accidents occurring in the Diamond Lane itself or on the median shows that at least five of these accidents were caused by vehicles carrying fewer than three passengers making unsafe lane changes. In three of these cases, the violators had been observed by the CHP prior to the accident. Further investigation of the impact of Diamond Lane violations on accidents proved impossible for two reasons:

1. In the case of minor accidents, the number of occupants of the automobiles involved is not always recorded in the accident report.

2. As noted, it is often impossible to identify the true cause of many of the reported rear-end collisions.

One possible cause of accidents in the Diamond Lane itself is the sudden entry into the lane by motorists in Lane 2 trying to use the preferential lane as a safety valve to avoid rear-enders in their own lane. It has been proposed that motorists in Lane 2, used to comparative absence of vehicles on their left in the Diamond Lane, may move suddenly into that lane in emergencies, posing a hazard for faster-moving traffic in the preferential lane. If this is a serious cause of accidents, it should show up in the reports of CHP officers. Examination of these reports shows that 27 accidents occurred in the Diamond Lane itself during the 21-week demonstration period, for an average of 1.3 accidents per week. Prior to lane implementation, an average of 2.7 accidents per week occurred in the Number One freeway lane. Because the number of vehicles using the Number One lane decreased substantially during the Diamond Lane demonstration, the number of accidents per million vehicle-miles during the demonstration increased considerably over pre-project levels. Allowing for the reported 72% reduction in vehicles using the Number One lane, the accident rate per vehicle-mile increased by a factor of 1.7 in the Number One lane during the project.

A breakdown of the 27 accidents occurring in the Diamond Lane itself on the basis of CHP reports shows that 13 of these accidents, or 48 percent, were caused by vehicles swerving into the lane to avoid trouble in their own lane, and colliding with a Diamond Lane vehicle. An additional 9 accidents, or 33 percent, were caused by unsafe lane changes made by vehicles facing no threat in their own lane. The remaining five Diamond Lane accidents, or 18 percent, were rear-end collisions between vehicles already in the Diamond Lane.

Vehicles swerving into the Diamond Lane to avoid rear-enders in their own lane were often out of control. In effect, they represented accidents about to happen, and the final nature of the accident depended only on whether there was an oncoming vehicle in the Diamond Lane. On at least 13 occasions, drivers originating in the Number 2 lane spun out to avoid rear-enders and collided with the highway median divider. On at least two other occasions, Diamond Lane drivers were forced into the median by automobiles bailing out of the Number 2 lane to avoid trouble. All of these accidents originated with stop-and-go conditions in the Number 2 lane, even though they are not reported as accidents in that lane.

<u>It seems clear that the combination of high Diamond Lane speeds, when coupled with slow stop-and-go traffic in the non-preferential freeway lanes, contributed to the observed increase in accidents during the Diamond Lane demonstration</u>. The exact extent of this contribution is impossible to determine. Under normal operating conditions, an incident-related slowdown in one lane generally results in a slowdown in all lanes. Given the reserved nature of the Diamond Lane, however, a slowdown in the remaining lanes usually just accentuated the speed differential between the Diamond Lane and the remainder of the freeway traffic. In recognition of the potential danger accompanying the juxtaposition of high Diamond Lane speeds and congested, stop-and-go traffic on the remainder of the Freeway, Diamond Lane bus drivers were instructed not to exceed the speed of other freeway traffic by more than 30 miles per hour. There is some evidence, however, that the driver carpooling in the Diamond Lane failed to exercise such prudence when other lanes had slowed to a halt due to accidents or congestion. One Diamond Lane driver, after colliding with a vehicle that nosed into the preferential lane in an attempt to avoid a collision in the Number 2 lane, answered a police inquiry as to why the carpool vehicle had not slowed in response to congestion and a visible accident in other freeway lanes, said, "My lane was clear; so why can't I go the speed limit if I want to?"

<u>The impact of the speed differential on accidents was exacerbated by the need for carpoolers to exit at many points along the freeway.</u> The non-CBD orientation of Los Angeles traffic meant that carpool drivers had to slow and weave their way through stop-and-go traffic to exit at many points along the freeway. Carpoolers responding to the driver survey cited problems exiting from the Diamond Lanes as the greatest single difficulty encountered in using the lanes. Accidents might have been reduced somewhat if more drivers

had followed the preferential lane to the end, where merging problems were minimized. The multi-centered nature of the Los Angeles area, however, increased the need for carpoolers to merge with slower traffic all along the freeway, thereby increasing the safety hazard associated with the inter-lane speed differential.

Hypothesis Group 4: Accidents are caused by the novelty of the Diamond Lane itself and the controversy surrounding it. The novelty of the Diamond Lane concept and the controversy surrounding it may have been a source of accidents for several reasons:

A. Driver confusion and experimentation in the early weeks of the project undoubtedly led to higher accident levels.

B. Faster movement in the preferential lane tends to distract drivers in other lanes, making them more susceptible to accidents.

C. Driver aggravation with the concept may have led to reckless, aggressive driving.

There seems to be little doubt that the surge of accidents during the first two weeks of the project may be traced to the newness of the concept and driver uncertainty regarding the use of the lane. Accident increases have been experienced in the early weeks of other preferential lane projects in which no barrier separates buses and carpools from the remaining lanes of traffic (see Section 10). After initial increases, freeway accidents in both Portland and Miami, where preferential lanes were created by adding a lane to the existing traffic flow, dropped below pre-project levels by the second month of operation. In another Miami project entailing the reservation of an existing highway lane for high-occupancy vehicles, the accident rate more than doubled in the initial months of the project. Although accidents have declined steadily in the two years since project implementation, the level remains higher than that experienced before the dedication of the lane.

Drivers of one- and two-passenger automobiles reported a tendency to count the heads appearing in cars whizzing by in the preferential lane (References 7.2 and 7.3). To the extent that the single-occupancy automobile driver persisted in this headcounting, he was less likely to be able to control his own vehicle in an emergency. As drivers became used to the preferential lane, this tendency should have diminished. Although accident rates also diminished as the project continued, there is no sure way to determine the extent to which decreased head-counting accounted for decreased accidents. Specific sources of driver distraction were rarely noted in accident reports, and it is possible that the driver himself may not have been aware of the distraction or may not have wished to admit his inattention to the reporting officer. Although the number of instances in which driver inattention was noted by the reporting officer as a contributing factor to a collision increased markedly during Diamond Lane operation, the relative incidence of such notations as a percentage of all possible contributing factors decreased slightly during the demonstration.*

Driver frustration and aggravation with the Diamond Lane itself may have contributed to the accident increase. One accident expert noted that the level of frustration would have been especially high among the aggressive drivers used to driving in the Number 1 lane. In testimony before the U.S. Superior Court, Paul O'Shea noted, "...you are taking the aggressive driver and the confident driver, and because he is not entitled to the Diamond Lane, putting him over into the slower traffic, which creates a tremendous frustration" (Reference 7.3). Unquestionably, such frustration did exist, as manifested in the public outcry against the project. However, it is impossible to estimate the extent to which such frustration may have increased the accident level.

Although future attitudinal surveys may shed more light on public attitudes toward the project, they are unlikely to illuminate further the connection between driver frustration and the accident level. Examination of CHP accident reports shows that at least two accidents occurring during Diamond Lane hours may be traced to public frustration with the concept itself. On June 3, drivers opposed to the Diamond Lane concept staged a funeral procession in the lane to protest the lane's existence. The distraction resulting from this demonstration was listed as a contributing factor in two accidents occurring on that day.

Hypothesis Group 5: Other potential accident explanations. The overall accident level on all Los Angeles freeways has been increasing steadily since the early months of 1974, following the gasoline crisis and the introduction of the 55 m.p.h. speed limit. This increase has been less pronounced during peak operating hours, when there is less chance of a vehicle exceeding the 55 m.p.h. speed limit. On the Santa Monica Freeway during peak operating hours, a linear least-squares regression from January 1974 to the start of the Diamond Lane project shows that the accident level increased by .0215 accidents per week over this period. Extrapolation of this trend would lead one to predict an increase of 0.45 accidents per week during the 21 weeks of Diamond Lane operation. This represents a small portion of the observed increase of 13.7 accidents per week accompanying the Diamond Lane project, indicating that general trends existing prior to the project had little effect on the accident situation. As indicated in the following section, moreover, freeway accidents rates dropped below pre-project levels following the close of the Diamond Lane demonstration, further discouraging any arguments that causes unrelated to the operation of the Diamond Lanes contributed to the pronounced increase in accidents during project operating hours.

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*Driver inattention was noted as a collision-associated factor in 43% of all accidents occurring during Diamond Lane operating hours. During a similar period in 1975, inattention was cited in 47% of the accident reports filed.

7.1.7 Postscript

Following the close of the Diamond Lane demonstration, accident levels on the Santa Monica Freeway returned to normal. Table 7.4 compares accident levels for the 12 weeks following the project with levels during the 21-week project and levels measured during a comparable 21-week period in 1975. During the 21-week period beginning March 17, 1975, an average of 8.8 accidents per week -- including 2.5 injury accidents -- occurred between 6:00 and 10:00 A.M. and 3:00 and 7:00 P.M. on Monday through Friday. During the 21 weeks of the Diamond Lane project, there were 25.1 accidents per week, including 5.7 injury accidents. In the 12-week period immediately following the Diamond Lane demonstration, accident levels dropped markedly to 5.8 accidents per week, including 1.8 injury accidents.

The sharp decline in accidents following the project is particularly notable in the Number 2 lane adjacent to the Diamond Lane. In the 12 weeks following the project, the number of accidents per week in that lane dropped to four, an average of 0.33 per week. During the project, 14.8 accidents per week had occurred in the Number 2 lane. The rapid drop in accident levels following the demonstration serves to emphasize the causal role of the Diamond Lane operations in increasing accidents on the Santa Monica Freeway.

7.1.8 Implications of Accident Analysis

The creation of the Diamond Lane on the Santa Monica Freeway through the dedication of an existing lane to buses and carpools caused the number of peak-hour accidents on the freeway to increase from a level of approximately ten accidents per week in the years preceding the project to a level of 25 accidents per week. The relative severity of accidents did not change significantly with the project. However, the relative percentage of rear-end accidents increased significantly, and the number of accidents occurring in the Number 2 lane adjacent to the Diamond Lane rose remarkably from under two accidents per week to 14.8 accidents per week.

A number of potential causes have been identified in an attempt to account for the observed increase in accident levels. These causes stem from a variety of factors, including increased CHP presence, increased congestion, the mechanics of Diamond Lane operation, the novelty of the Diamond Lane concept, and exogeneous events. While it is likely that each of the factors identified contributed to one or more accidents during the Diamond Lane demonstration, an analysis of these factors in the light of the accumulated accident data makes it possible to discount the possibility that certain of the potential causes had a major influence on the accident picture. Among the causes which do not appear to explain a measurable share of the accident increase are:

TABLE 7.4: ACCIDENT SUMMARY FOR SANTA MONICA FREEWAY BEFORE, DURING AND AFTER DIAMOND LANE OPERATION

(Monday Through Friday: 6-10 AM and 3-7 PM; AM Hours Changed 5/17/76 to 6:30-9:30 AM)

	BEFORE		DURING			AFTER		
	3/17/75 to 8/8/75 21 Weeks 8 Hours/Day		3/15/76 to 8/6/76 21 Weeks 8 Hours/Day Before 6/17 7 Hours/Day After 6/17			8/9/76 to 10/29/76 12 Weeks 7 Hours/Day		
	Total No.	% of Total	Total No.	% of Total	% of 1975	Total No.	% of Total	% of 1975**
Total Accidents	180	100%	527	100%	293%	70	100%	78%
Accidents/Week	8.6		25.1			5.8		
Severity								
Fatality	0	0%	0	0%	0%	0	0%	0%
Injury	50	27.8%	120	22.8%	240%	22	31.4%	88%
a. Severe		3%***	1	0.8%		0	0%	
b. Other Visible		39%***	46	38.3%		10	45.5%	
c. Complaint of Pain		58%***	73	60.8%		12	54.5%	
Property Damage Only	130	72.2%	407	77.2%	313%	48	68.6%	74%
Time/Direction								
Eastbound AM	51	28.3%	108	20.5%	212%	31	44.3%	122%
Westbound AM	19	10.6%	65	12.3%	342%	8	11.4%	84%
Eastbound PM	43	23.9%	178	33.8%	414%	12	17.1%	56%
Westbound PM	67	37.2%	176	33.4%	263%	19	27.1%	57%
Eastbound	94	52.2%	286	54.3%	304%	43	61.4%	91%
Westbound	86	47.8%	241	45.7%	280%	27	38.6%	63%
Type of Collision								
Head-on	2	1.1%	2	0.4%	100%	1	1.4%	100%
Sideswipe	23	12.8%	47	8.9%	204%	11	15.7%	96%
Rear-end	122	67.8%	422	80.1%	346%	50	71.4%	82%
Broadside	12	6.7%	9	1.7%	75%	0	0%	0%
Hit Object	13	7.2%	42	8.0%	323%	7	10%	108%
Other	8	4.4%	5	0.9%	63%	1	1.4%	25%
Lane								
Median	14†	6.9%	24	4.6%	171%	4	5.7%	57%
Diamond Lane	55†	27.0%	27	5.1%	49%	12	17.1%	44%
No. 2 Lane	29††	14.2%	310	58.8%	534%	4	5.7%	14%
No. 3 Lane	29††	14.2%	51	9.7%	88%	7	10.0%	24%
No. 4 Lane	68†	33.3%	33	6.3%	49%	19	27.1%	56%
Other	9†	4.4%	82	15.6%	911%	24	34.3%	533%

*Source: Memorandum from C.P. Sweet to C.E. Forbes, CALTRANS, January 11, 1977.

**In comparing "after" data with 1975 data, 12-week, 7-hour operations during the "after" period have been factored up to 21-week, 8-hour operations to provide comparability with the 1975 base period.

***Percentages for severity of "before" injury accidents reflect peak-period statistics for a sample of 1975 accidents.

†Prior to the project, more than one location was recorded for each accident when multiple collisions occurred. Hence, the total number of lane locations adds to a total greater than the number of accidents.

††Prior to the project, accident data did not distinguish between the Number 2 lane and the Number 3 lane. A total of 58 accidents recorded in these median lanes have been split evenly between the two lanes.

- Overreporting of minor accidents as a result of increased CHP presence; and

- Such exogenous factors as a general tendency to travel more or pay less attention to the 55 m.p.h. speed limit.

Potential causes which could not be discounted but which do not appear sufficient to account for a substantial share of the accident increase include the following:

- The distracting effect of the increased CHP ticketing activities; and

- The closing of one freeway lane to general use; that is, it is unlikely that the accident rate would have risen substantially if the median lane had simply been closed to all traffic.

The one potential cause which could not be discounted, and which does in fact appear to account for a large share of the accident increase is:

- The pronounced speed differential resulting from the combination of unhindered traffic in the sparsely occupied preferential lane and congested, stop-and-go conditions in the remaining lanes, coupled with the lack of barriers between lanes and the variety of possible origins and destinations along the length of the project.

Although it is impossible to quantify the relative contribution of each of the above factors to the increased accident rate, it seems most likely that the speed differential is the most important cause. The increased CHP ticketing activities do not provide a direct explanation for the remarkable increase in accidents in the Number Two lane, and a correlation of accident and enforcement levels during the demonstration period explains a relatively small proportion of the observed accident variation. Furthermore, equivalent congestion levels existed on portions of the Freeway prior to both the 1967 lane enlargement and the introduction of ramp metering without causing accident levels to skyrocket.

Because of the shortened duration of the project, the effect of Diamond Lane novelty on accident levels can never be known with certainty. The tendency to gawk and count the heads of passing carpoolers would certainly have diminished with time. It is not possible, however, to project with confidence the accident level that would have existed following a longer period of operation. After extremely heavy accident rates during the first two weeks, accident levels tended to decline over the length of the project. Although the rate of decline slowed with time, the relative number of accidents per vehicle-mile was still declining when the project was terminated.

Given the nature of the most likely explanations for the increased accident rate, several occurrences could have brought about a decline in accident levels. To the extent that usage of the preferential lane increased with time, the speed differential would decrease as the preferential lane became more crowded and congestion in the non-preferential lanes was reduced by the elimination of defecting carpoolers and bus riders. The reduction of CHP enforcement levels would also work in two ways to reduce the level of accidents: First, by eliminating the distraction of the ticketing activity itself and, second, by permitting more violators to shift to the preferential lanes, thereby cutting the speed differential and easing congestion in the non-preferential lanes. Thus, to some extent, the elimination of either of these two accident sources tends to work against the presumed concept of the preferential lane. As the speed differential is reduced, so also is the inducement to use the lane. Moreover, any decision to relax enforcement must, by encouraging violators, run counter to the philosophy of a lane reserved for high-occupancy vehicles.

The apparent dilemma whereby reduced accidents might be achieved at the cost of lane operating efficiency highlights the delicacy of the control problem faced by planners attempting to design barricade-free preferential lanes for use in mixed traffic. On the one hand, if the preferential lane operates below capacity with a significant speed differential relative to adjacent congested lanes, accidents are almost certain to increase. If the lane is allowed to fill, however, either by allowing violators to infiltrate or by relaxing the requirements for the use of lane (i.e., by allowing two-person carpools to use the lane), much of the inducement for using the lane vanishes. In theory, the number of carpools should grow over time until the marginal amount of time saved by switching to a carpool exactly balances the perceived inconvenience of making the switch. In practice, the level of accidents occurring before this equilibrium point is reached may be unacceptable to society, or the equilibrium point itself may result in an unacceptable accident rate.

The specter of increased accidents raises serious questions regarding the feasibility of the barrier-free preferential lane concept. These questions appear to exist whether the lane is created by reserving an existing lane, as was done on the Santa Monica Freeway, or by creating an entirely new lane, as has been done in Portland and Miami (see Section 10) and is contemplated on the San Diego Freeway in Los Angeles. The extent of the problem is difficult to assess at present, since neither Portland nor Miami has experienced an accident increase to date. In both these projects, however, enforcement activities are reduced, the influx of violators is relatively heavy, and the speed differential is not so great as in the Santa Monica Freeway project. Conceivably, however, the addition of a new preferential lane to an existing freeway could also result in increased accidents if stop-and-go traffic conditions exist in the non-preferential lanes, a significant speed differential is maintained between these lanes and an underutilized preferential lane, and destinations are scattered so that carpoolers enter and exit at many points along the lane. Further investigations of the relationship between accident levels and the operation of barrier-free preferential lanes should be undertaken as soon as possible so that the risks attending these operations may be more clearly defined.

7.2 VIOLATIONS

Preferential lane violations occur when automobiles with fewer than three occupants use the Diamond Lanes. There are at least two methods for measuring the level of violations: (1) direct observation of vehicles using the lane, and (2) tabulation of the number of citations and warnings issued by the CHP to drivers using the lane illegally. Since the number of citations and warnings issued is dependent on the level of police deployment on any given day, direct observation represents the most reliable means of assessing the incidence of violations.

7.2.1 Trends Over Time

During the Diamond Lane project, vehicle occupancy counts were taken at five different locations along the length of the freeway. The Western Avenue screenline was surveyed most often, with occupancy counts scheduled twice per week over the length of the project. Although counts were made much less frequently at the remaining locations, a check of the results obtained at these locations parallels the Western Avenue findings. Exhibit 7.5 plots the violation rate observed at Western Avenue over the length of the project. This rate is defined as the ratio of vehicles with fewer than three occupants to the total number of vehicles in the lane. On the opening day of the project, 40% (eastbound and westbound) of all vehicles using the preferential lanes did so illegally. The violation rate then dropped off rapidly and fluctuated between 10% and 20% for the duration of the project. Table 7.5, prepared by CALTRANS, lists the average number of daily violations observed at the Western Avenue screenline on a week-by-week basis.

7.2.2 Trends With Time of Day and Direction

A sampling of Diamond Lane violations observed through the month of July produces the following breakdown of violation rates by direction and time of day:

	A.M.	P.M.	Combined
Eastbound	.124	.137	.132
Westbound	.126	.190	.172
Combined	.125	.164	.151

TABLE 7.5

AVERAGE DAILY VIOLATIONS

(Western Avenue Screenline)

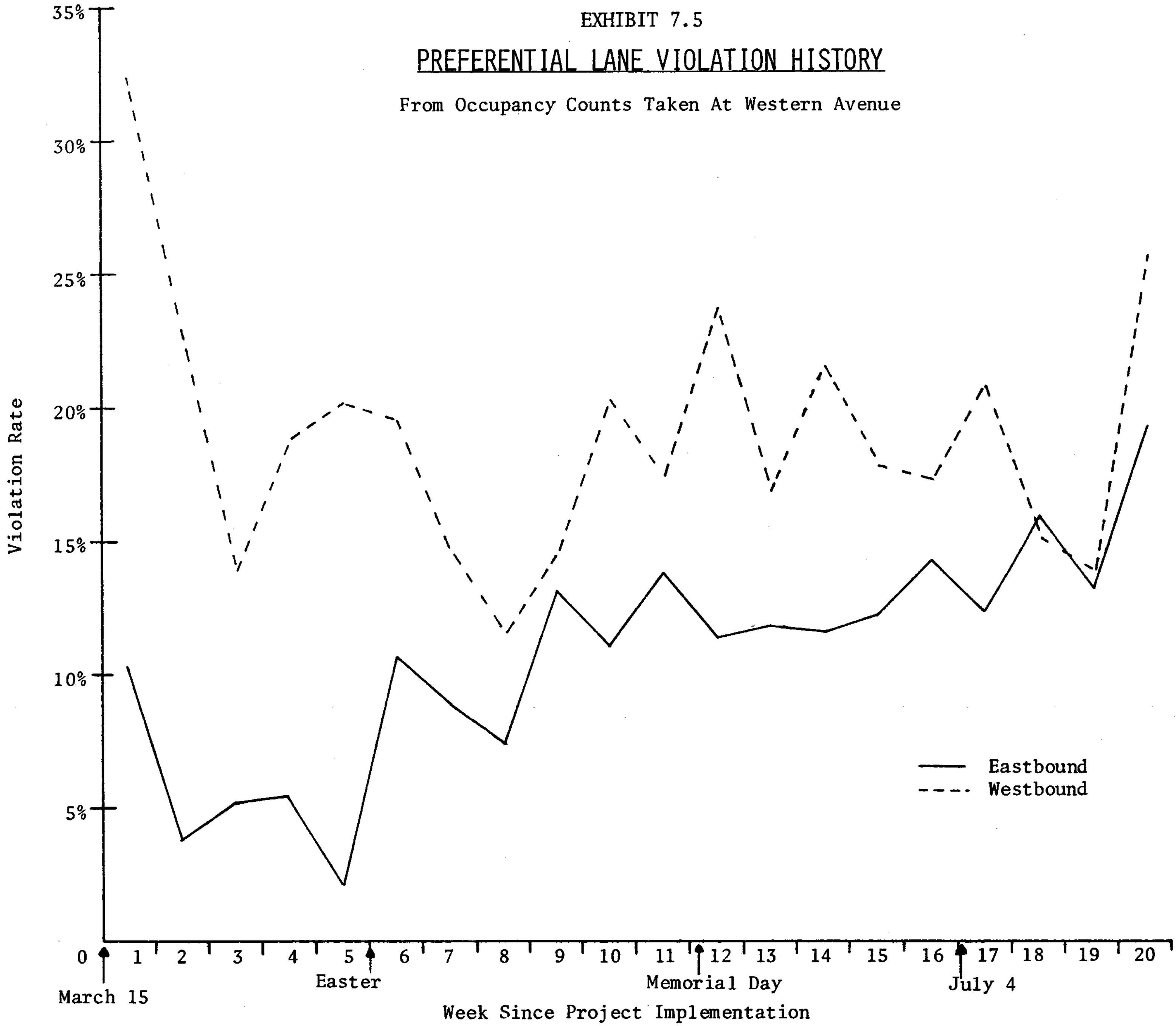
Week	Average Daily Violators	% of Diamond Lane Traffic	% of All Traffic
1	877	18.4	1.2
2	821	16.2	1.0
3	627	11.7	0.8
4	738	15.8	0.9
5	N/A	--	-
6	885	17.0	1.1
7	650	13.3	0.8
8	515	10.9	0.6
9	844	17.4	1.0
10	744	13.9	0.9
11	706	14.8	0.8
12	806	15.6	0.9
13	598	11.8	0.7
14	1050	17.9	1.2
15	940	15.9	1.1
16	942	15.7	1.1
17	1034	17.4	1.2
18	923	15.6	1.1
19	720	12.8	0.9
20	1112	18.0	1.3
21	988	15.7	1.1

(Source: CALTRANS 21-Week Report)

EXHIBIT 7.5

PREFERENTIAL LANE VIOLATION HISTORY

From Occupancy Counts Taken At Western Avenue



As indicated, the violation rate in the westbound direction in the evening (.190) was significantly ($\alpha < 0.001$) higher than the eastbound violation rate of .137. Traffic volumes were highest during the westbound evening peak, so that the potential benefits accompanying the illegal use of the Diamond Lanes were increased for the tired, homebound motorists on the road at that time.

Exhibit 7.6 shows that most of the observed violations occurred at the beginning and end of the hours of operation. An estimated 39% of all violations occurred in the first and last 15 minutes of the morning and evening operating hours, which represented only 14% of the seven hours of daily Diamond Lane operation. Presumably, motorists on the road at the time of the Diamond Lane changeovers were either unaware of the time or lazy about obeying the law so close to the time at which they could use the lane legally. Because of the bunching of violations at the beginning and end of the operating hours, the violation rate prevailing throughout the remainder of the peak period was only about 6% in the morning and 11% in the evening.

7.2.3 Comparisons With Other Projects

The level of violations experienced on the Santa Monica Freeway is relatively low when compared with levels on other barrier-free preferential lane freeway projects. The violation rate on the exclusive lane operating on Interstate 95 in Miami, Florida ranged between 55 and 65 percent at the start of the project and dropped to between 35 and 40 percent after one year of operation. On Portland's Banfield Freeway, early violation rates ranged between 30 and 40 percent, dropping to 18 percent after six months of operation. During the first year of the San Francisco-Oakland Bay Bridge toll plaza bus and carpool lanes, violations occurred at a 30 percent rate. The lower violation rate on the Santa Monica Freeway project may be traced to the availability of a median strip for enforcement purposes and the cooperation of the CHP in enforcing the preferential lane restrictions from the early days of the project.

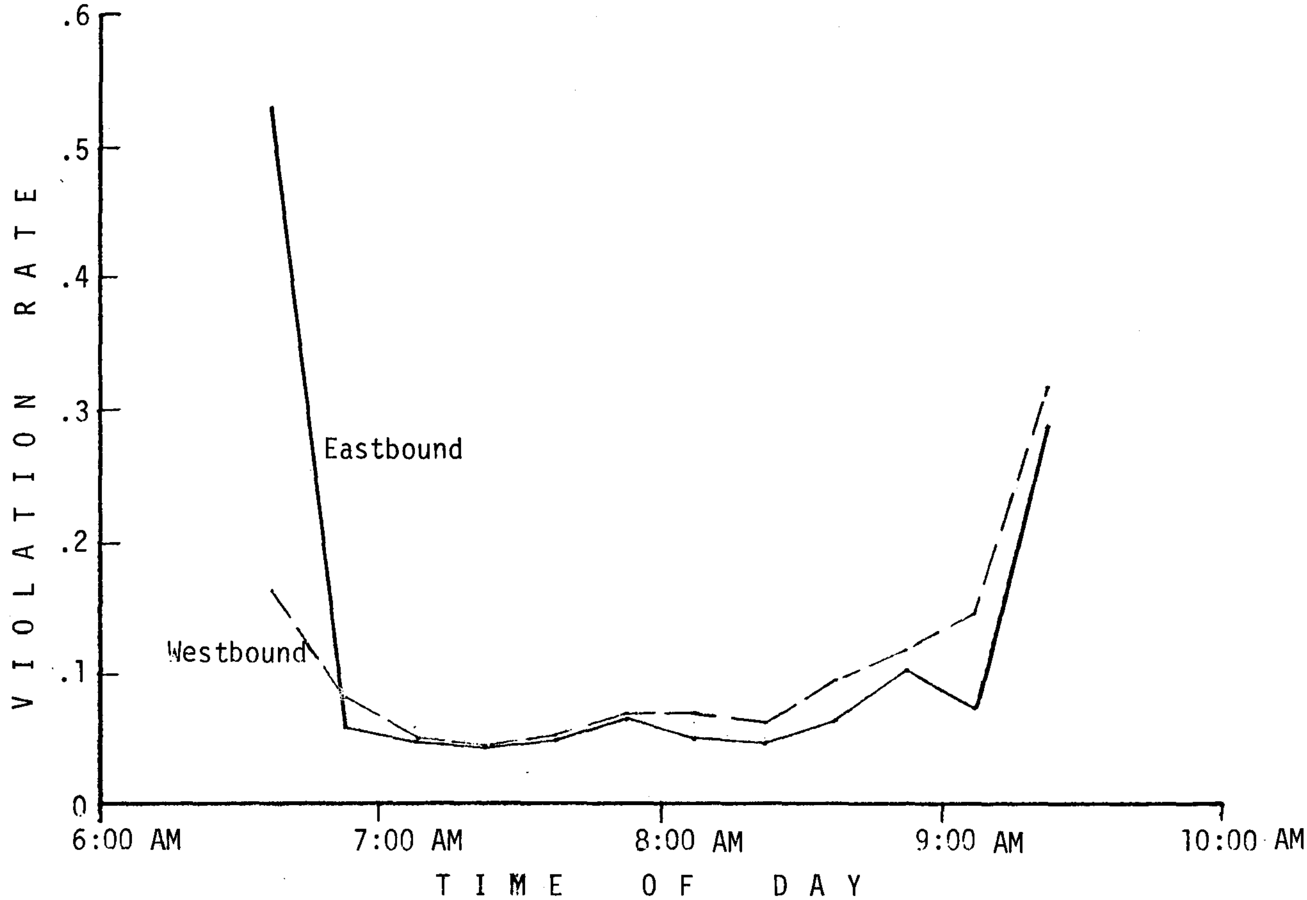
7.3 DEPLOYMENT AND ENFORCEMENT

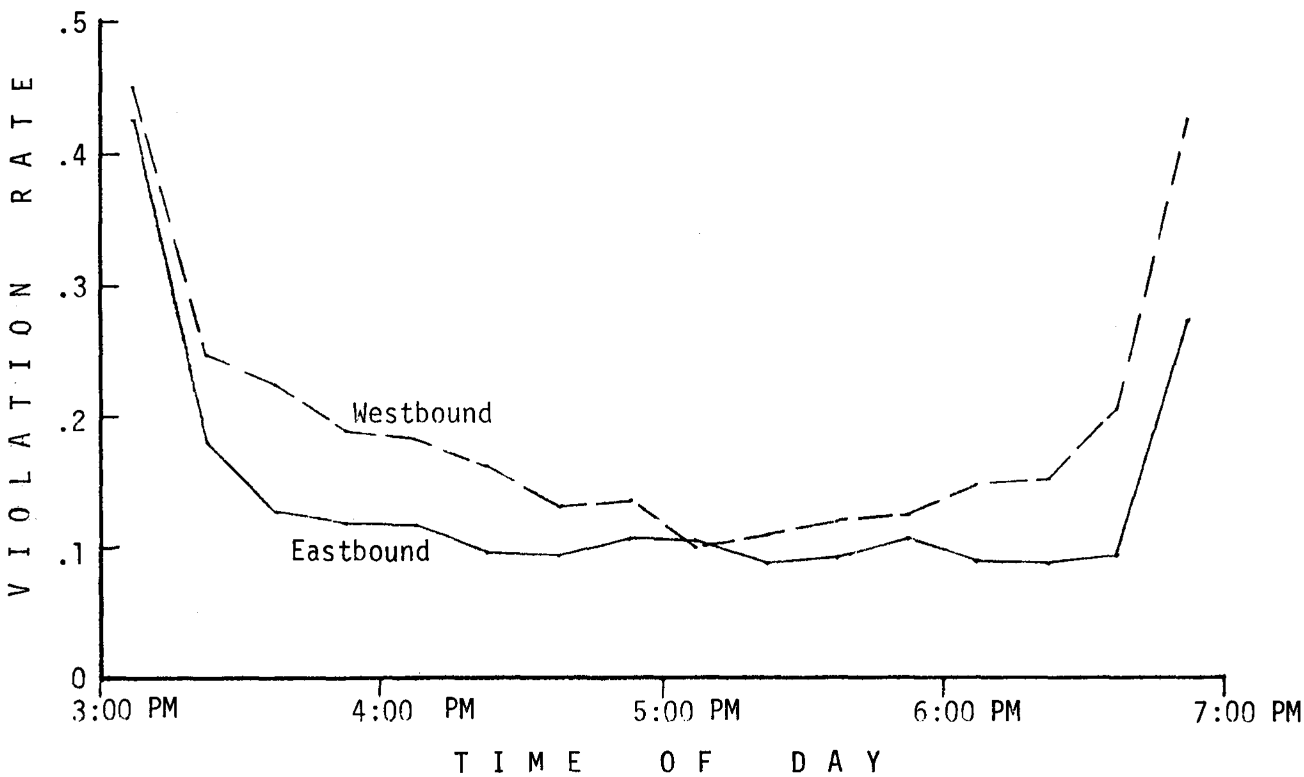
7.3.1 Police Deployment

Responsibility for traffic management over the length of the Diamond Lane project was split between two Command Areas of the California Highway Patrol. The Western Los Angeles Command Area was responsible for police surveillance on three beats west of La Cienega Boulevard, while the Central Los Angeles Command Area was responsible for surveillance on four beats east of La Cienega Boulevard. Prior to the implementation of the Diamond Lane project, normal deployment over the 12.9-mile segment averaged 76.3 man-hours per day from 6:00 to 10:00 A.M. and from 3:00 to 7:00 P.M. This corresponds roughly to a deployment level of ten officers on the morning shift and nine officers on the evening shift.

EXHIBIT 7.6: PREFERENTIAL LANE VIOLATION RATE BY TIME OF DAY

(From Occupancy Counts Taken at Western Avenue)





During the first week of the Diamond Lane project, deployment levels rose to between 15 and 20 officers per shift, approximately double pre-project levels. For the most part, the additional manpower was diverted from other beats under the control of the respective Command Areas. To the extent possible, the additional units consisted of motorcycles rather than patrol cars, since the added maneuverability of the motorcycle units eased the enforcement problem. Deployment levels were reduced gradually over the first 12 weeks of the project, so that the average surveillance level over these weeks was roughly 50 percent higher than normal. By the thirteenth week of the demonstration, the level of officer deployment approximated that in effect prior to the Diamond Lane project. Exhibit 7.7 traces the day-by-day history of officer deployment throughout the demonstration.

7.3.2 Enforcement

Over the 21-week duration of the Diamond Lane project, CHP officers issued an estimated 5,830 citations to drivers observed using the lane illegally (in violation of Vehicle Code 21655.5). A total of 6,366 warnings were given out, with over 1,000 of these issued on the first day of operation. An additional 3,338 citations were issued to drivers violating the two-occupant requirement on ramp-bypass lanes. Citations and warnings together represented a total of 15,534 enforcement contacts for occupancy violations over the length of the project, or an average of 151 contacts per day.

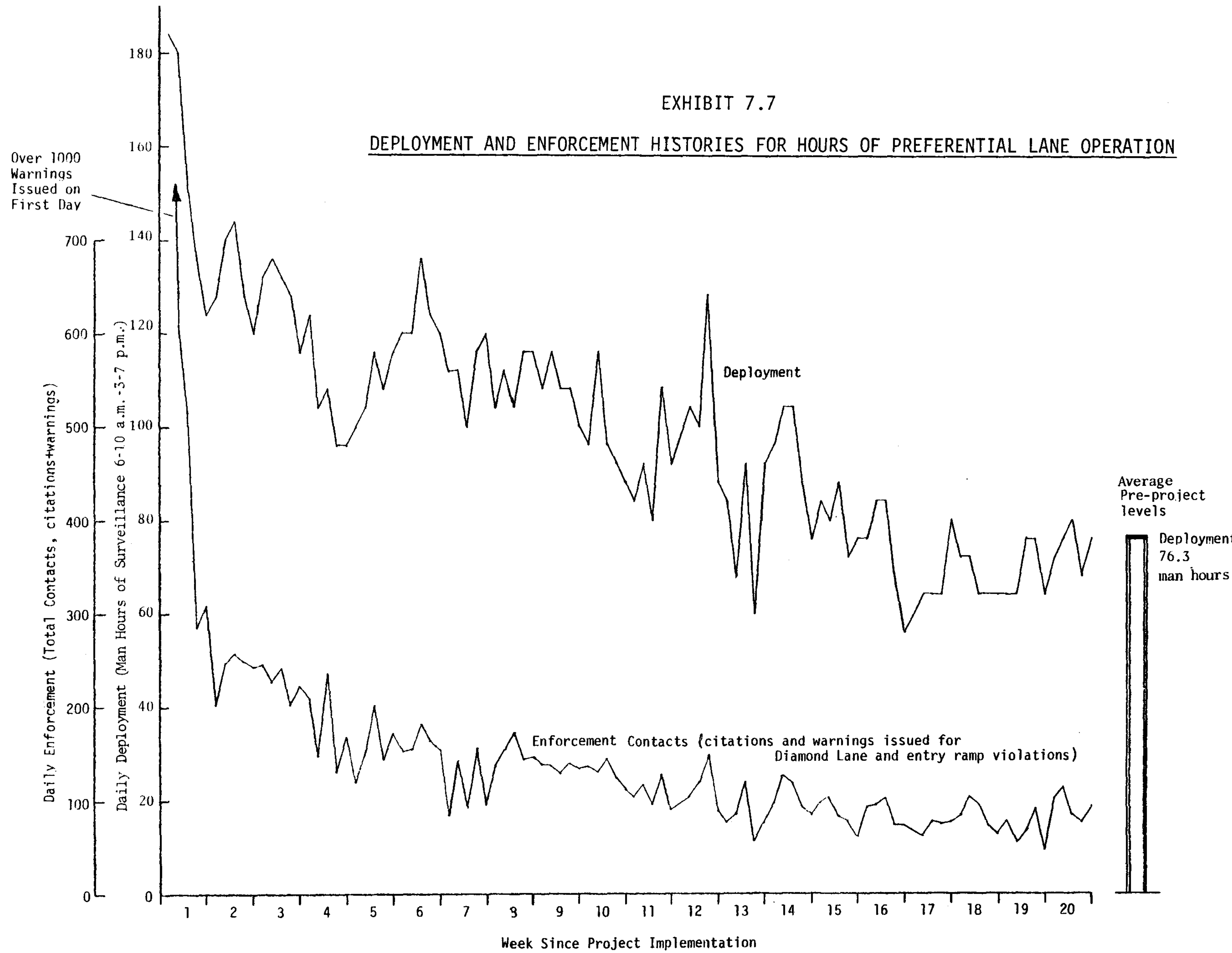
Exhibit 7.7 plots the day-by-day variation in enforcement contacts over the length of the project. A comparison of the enforcement history with the deployment levels plotted in the same exhibit reveals that a strong correlation exists between the number of assigned officers and the number of enforcement contacts made daily. A linear regression analysis confirms this correlation, suggesting that each additional man-hour assigned to the Diamond Lane project increased the level of Diamond Lane-related enforcement contacts by roughly two warnings and citations.*

The existence of a strong relationship between the number of available officers and the number of citations and warnings issued is hardly surprising. With an average of 825 violations per day observed at the Western Avenue screenline alone, there were more than enough violators to occupy the time of any CHP units assigned to the freeway. As noted, however, when expressed as a fraction of total lane traffic and compared with other similar projects, the level of violations experienced on the Santa Monica Freeway Diamond Lanes was relatively low. This relatively low violation rate may be attributed to the cooperation of the CHP, whose highly visible enforcement efforts discouraged violators and drove the violation rate down early in the project. The observed violation rate showed little sign of increase with the reduction in deployment and enforcement levels in the later weeks of the project. The importance

*At a significance level of .001, the regression analysis generates a correlation coefficient of $r = 0.743$ between deployment and enforcement.

EXHIBIT 7.7

DEPLOYMENT AND ENFORCEMENT HISTORIES FOR HOURS OF PREFERENTIAL LANE OPERATION



of CHP presence to the operation of the preferential lane was underscored in the final week of the project. Even though Judge Byrne's decision on Monday, August 9 stipulated that the lane would continue in effect until Friday, August 13, traffic returned to normal in the lane as soon as it was publicized that the CHP would not ticket violators during the last week of operation.

Enforcement of the Diamond Lane provisions during the project was facilitated by the existence of a median strip where violators could be cited without being escorted across three or four lanes of traffic to the right shoulder of the roadway. Helicopter and roadside observers soon noted, however, that the use of the median for enforcement also interfered with the flow of traffic in other lanes (Reference 7.1 and 7.4). The use of the median for enforcement led to gawking and traffic slowdowns, particularly in the nearby Number 2 lane. Since it was observed that black and white patrol cars stopped in the median appeared to cause more disruption than motorcycles, a June directive from the CHP suggested that, where possible, patrol cars should use the right shoulder for enforcement. As a practical matter, this often proved to be impossible during peak-hour traffic conditions.

7.4 SURFACE STREET ACCIDENTS

One of the potential side effects of the Diamond Lane project was the possibility that traffic diverted from the Santa Monica Freeway might raise the level of congestion and increase the number of accidents on surface streets in the corridor surrounding the freeway. Section 5 has discussed the effect of the project on the levels of traffic and speeds on these corridor streets. As part of the project evaluation, statistics were also compiled summarizing accident levels on selected corridor streets before and during the Diamond Lane project.

7.4.1 Accidents by Route

Eleven major streets paralleling the Santa Monica Freeway were selected as a sample population to support an investigation of surface street accidents during the Diamond Lane project. These streets are listed in Table 7.6. For the first 18 weeks of the Diamond Lane project, all accidents occurring on those portions of these streets between the San Diego and Harbor Freeways were recorded and sorted by time of day, severity, and primary cause. Similar statistics were obtained for equivalent time periods in the years 1971 through 1975.

Table 7.6 lists the total accidents occurring by route during the original Diamond Lane operating hours for the first 18 weeks of the project, and compares these levels with those experienced during comparable time periods in the five previous years. This comparison shows that the level of accidents experienced on surface

TABLE 7. 6

TOTAL ACCIDENTS BY SURFACE ROUTE

BETWEEN THE SAN DIEGO AND HARBOR FREEWAYS

(6:00-10:00 AM and 3:00-7:00 PM Weekdays)

Location	BEFORE PROJECT							DURING PROJECT	% Change	
	Eighteen Consecutive Weeks Beginning in Mid-March						18 Weeks Prior to Project	18 Weeks * of ◊ Lane Operation	From 5-Year Average	From 18 Prior Weeks
	1971	1972	1973	1974	1975	5-Year Average				
Adams Boulevard	58	59	60	54	48	55.8	44	31	-44.4	-29.6
Exposition Boulevard	25	35	26	22	23	26.2	25	29	+10.7	+16.0
Jefferson Boulevard	56	39	44	34	29	40.4	30	48	+18.8	+60.0
National Boulevard	14	16	20	15	13	15.6	26	22	+41.0	-15.4
Olympic Boulevard	87	76	91	89	84	85.4	93	96	+12.4	+3.2
Pico Boulevard	87	94	89	95	87	90.4	74	117	+29.4	+58.1
Rodeo Boulevard	28	16	22	18	22	21.2	16	19	-10.4	+18.8
Santa Barbara Ave.	40	44	38	37	37	39.2	39	26	-33.7	-33.3
Venice Boulevard	49	67	86	49	49	60.0	66	70	+16.7	+ 6.1
Washington Blvd.	42	50	42	42	40	43.2	46	41	- 5.1	-10.9
Wilshire Boulevard	75	90	95	75	88	84.6	84	92	+ 8.8	+ 9.5
TOTALS	561	586	613	530	520	562	543	591	+ 5.2	+ 8.8
Average Per Week	31.2	32.6	34.1	29.4	28.9	31.2	30.2	32.8	+ 5.2	+ 8.8

*At the time the analysis was performed, records were available for only 18 weeks of Diamond Lane operations.

streets in the freeway corridor during the Diamond Lane project was 5.2 percent higher than the average level experienced in the five years preceding the project and 8.8 percent higher than the level experienced during the 18 weeks immediately preceding project implementation.

7.4.2 Accident Severity

The total accident picture presented in Table 7.7 contains a high percentage of accidents involving property damage only (PDO). In view of the uncertainty surrounding the influence of officer presence on PDO accidents, particularly on surface streets, the incidence of more serious accidents involving personal injuries provides a more consistent picture of the relative change in corridor accidents from year to year. Table 7.7 lists the sample corridor accidents in order of severity, from PDO accidents through three degrees of injury, to fatalities. This table shows that the number of injury accidents on corridor surface streets during the Diamond Lane project increased by 3.4 percent over the average level for the five preceding years, and by 9.9 percent over the level during the 18 weeks preceding the project. The number of accidents involving serious injuries and fatalities actually declined during the Diamond Lane project in comparison with both the average of five prior years and with the 18 weeks prior to the project.

7.4.3 Statistical Significance of Changes

The day-to-day variability of accident levels on surface streets in the freeway corridor was great enough so that there was no assurance that the observed accident increases were not a chance occurrence. A t-test applied to the weekly accident levels on surface streets in the Santa Monica Freeway corridor attaches no statistical significance (at the .05 level) to the observed differences between injury accidents during the Diamond Lane period and injury accidents during the selected base periods. Similar results were obtained in testing the significance of the observed increase in total accidents.

Thus, although the surface accident levels were seen to increase slightly during the demonstration, statistical evidence linking this increase with the Diamond Lane project is inconclusive.

7.4.4 Accident Patterns and Causes

Unlike freeway accidents, which were at a high level early in the project and declined with time, the level of surface street accidents observed during the Diamond Lane operating hours showed no significant decreases over the early weeks of the project. Near the end of June, peak-hour accidents dropped markedly, reflecting the effect of summer vacations. Historically peak-hour accidents on surface streets in the corridor have dropped during the summer months of June, July and August.*

*A breakdown of peak-hour corridor accidents by season during the years of 1971-75 show the following: winter 24.7%; spring 24.9%; summer 22.9%; and fall 27.6%.

TABLE 7.7

SURFACE STREET ACCIDENT SEVERITY

(6:00-10:00 AM and 3:00-7:00 PM on Weekdays on 11 Major East-West Routes)

Type of Accident	BEFORE PROJECT: Eighteen Consecutive Weeks Beginning in Mid-March						BEFORE PROJECT	DURING PROJECT	% CHANGE	
	1971	1972	1973	1974	1975	5-Year Average	18 Weeks Prior to Project	18 Weeks* of ◊ Lane Operation	From 5-Year Average	From 18 Prior Weeks
PDO	272	258	289	235	252	261.2	261	280	+ 7.2	+ 7.3
Complaint of Pain	146	158	182	178	165	165.8	170	188	+13.4	+10.6
Visible Injury	128	142	132	103	91	119.2	99	112	- 6.0	+13.1
Serious Injury	13	24	10	14	11	14.4	12	10	-30.6	-16.7
Fatality	2	4	—	—	1	1.4	1	1	-28.6	0.0
Totals	561	586	613	530	520	562	543	591	+ 5.2	+ 8.8
Average Per Week:										
PDO Accidents	15.1	14.3	16.1	13.0	14.0	14.5	14.5	15.5	+ 6.9	+ 6.9
Injury and Fatal Accidents	16.1	18.2	18.0	16.4	14.9	16.7	15.7	17.3	+ 3.4	+ 9.9
Total Accidents	31.2	32.6	34.1	29.4	28.9	31.2	30.2	32.8	+ 5.2	+ 8.8

*At the time the analysis was performed, records were available for only 18 weeks of Diamond Lane operations.

Historically, four major causes accounted for 50 percent of the peak-hour surface street accidents in the Santa Monica Freeway corridor during the five years preceding the Diamond Lane project. These four causes were speed (13.2%), failure to yield right-of-way to a vehicle turning left (12.2%), following too closely (11.7%), and failure to observe a signal light (11.0%). These causes remained predominant during the Diamond Lane demonstration, although the relative importance of left-turn problems increased slightly &op 3.9% to 16.;% of all accidents) at the expense of speeding (down 2.5% to 10.7% of all accidents).

7.4.5 Areawide Accident Patterns

Accidents throughout the City of Los Angeles showed slight increases during the period of Diamond Lane operation. This represents a continuation of an increasing trend initiated following the drop in accidents occurring during the 1974 gasoline crisis. Table 7.8 lists city-wide surface street accidents during the second quarter of each year from 1971 to 1975 and during the first quarter of 1976. A comparison of accidents occurring in the second quarter of 1976 with each of these bases shows slight increases in both PDO and injury accidents during the period of Diamond Lane operation. This general areawide increase in accidents makes it still more difficult to make conclusive statements regarding the relative impact of the Diamond Lanes upon the observed increases in corridor surface street accidents.

7.4.6 Other Accident Comparisons

Although attempts to compare surface street accident levels during the Diamond Lane operation with accident levels during the five previous years and with the period immediately preceding project implementation provide inconclusive results, other bases of comparison are available. In making independent comparisons of surface street accident levels before and during the Diamond Lane project, the LADT selected 1975 as a base year in compiling "before" data, as well as the period immediately before the project. Since surface street accident levels during the months of March through August, 1975, were lower than accident levels during comparable time periods in the four preceding years (see Tables 7.6 and 7.7), comparisons of accident levels during Diamond Lane operations with the base year 1975 result in higher relative increases than the comparisons with five previous years made in this report.

In a widely publicized press conference held in mid-June, 1976 on the impact of Diamond Lanes on city streets, the then-head of the LADT, S.S. Taylor, reported that accidents on surface streets had increased 30% during Diamond Lane operations. The report issued at the same time as the press conference showed that the LADT data indicated more mixed results. Injury accidents on a sample of east-west streets were up 30.6 percent between the month immediately preceding

TABLE 7.8

SUMMARY OF CITYWIDE SURFACE STREET ACCIDENTS

(Selected Quarters--1971 Through 1976; All Hours)

Type of Accident	BEFORE ◇ LANE							DURING ◇ LANE	% CHANGE	
	Second Quarter Statistics						1st Quarter 1976	2nd Quarter 1976	From 5-Year Average	From First Quarter
	1971	1972	1973	1974	1975	Average 1971-75				
PDO	8771	9296	9263	8699	9290	9064	9080	9256	+ 2.1	+ 1.9
Injury	7555	7798	7633	6957	7060	7400	7049	7420	+ 0.3	+ 5.3
Fatality	76	91	74	65	66	74	71	59	-20.3	-16.0
Total	16402	17185	16970	15721	16416	16538	16200	16735	+1.2	+ 3.3

(Source: Los Angeles Police Department)

the project and the first month of the project, but up only 10.3% over the corresponding month in 1975. Moreover, accident levels had actually declined on a sampling of north-south streets, so that the net result indicated in the report, but not in the day's press coverage, was a 3% decline in accidents relative to 1975 and a 14% increase relative to the month before the project. A later press article attempted to correct the impression left by the headlines proclaiming a "Street Accident Rise," but the 30% figure gained currency through its frequent use by foes of the project.

In a much more thorough, but unpublicized, study of surface street accidents completed after the closing of the Diamond Lanes, the LADT found that total accidents on a sampling of eleven east-west routes increased 23% during the hours of Diamond Lane operation when compared with the same period during the base year 1975. A similar comparison on a sampling of eleven north-south routes showed an increase of 13%. Comparisons of injury and fatal accidents occurring during project operation and the base year 1975 showed that these more serious accidents increased 28% on east-west routes and 23% on north-south routes during Diamond Lane operation.

The sample routes selected for analysis by LADT differed slightly from the routes identified in Table 7.6. As noted, morever, accidents on all Los Angeles surface streets have increased since 1975, when street accident levels were particularly low. In the absence of further research into the subject of surface street accidents, the most enlightening conclusions that can be drawn from the existing comparisons are: Serious (i.e., injury and fatal) surface street accidents during the hours of Diamond Lane operation increased significantly (on the order of 23 to 28 percent) over comparable time periods during 1975, a low-accident year. Less pronounced increases (on the order of 3 to 10 percent) were also observed when serious accidents during the project were compared with the five-year average prior to the project, and with the four months immediately preceding project implementation. Because of the fluctuations inherent in the surface street accident levels, however, no statistical significance (at the .05 level) could be attached to these less pronounced increases.

CHAPTER 7 REFERENCES

1. California Department of Transportation,[2] "Accident Study: Santa Monica Freeway Diamond Lane," Draft Report prepared by CALTRANS Freeway Operations Branch, Los Angeles, May 20, 1976.

2. Memorandum from J. W. Billheimer of SYSTAN, Inc. to Santa Monica Freeway Project Workers concerning "The Evaluation of Accidents on the Santa Monica Freeway," Los Altos, California, April 19, 1976.

3. Testimony of Paul O'Shea before the U.S. District Court, Central District of California, Civil Action No. 76-1153-WMB, Pacific Legal Foundation, et al., vs. Burns, Gianturco, and Patricelli. Reporters' Transcript of Proceedings, Los Angeles, California, Thursday, July 15, 1976 and Friday, July 16, 1976, pp. 2539-2731.

4. Memorandum from Lt. William B. Russell, to California Highway Patrol, Zone V, Los Angeles, concerning the Santa Monica Preferential Lane, Los Angeles, California, March 22, 1976.

5. California Highway Patrol, "Operation 500: A Study of the Effect of Increased Road Patrol," Final Report, Sacramento, California, April, 1972.

6. California Transportation Agency, Department of Public Works Division of Highways, "Effect on Traffic Operation of Use of Shoulder as Travelled Way or Portions of the Santa Monica Freeway, Internal Report No. 68-1 of the Freeway Operations Department, District 7, Los Angeles, January, 1968.

7. Letter from Lt. D. L. Leach, CHP Long Range Planning faction, to Capt. Emil E. Brandaw, Oregon Department of State Police, June 4, 1976.

8. ENERGY CONSUMPTION AND AIR QUALITY

8.1 ENERGY CONSUMPTION

To ascertain the impact of the Diamond Lane project on energy consumption, a computer model was formulated to compute the average amount of fuel consumed per day during the seven project operating hours. Fuel consumption estimates were made for motorists on the Santa Monica Freeway and parallel city streets in the corridor before, during and after the project. The model also accounted for trips previously made on the Santa Monica Freeway that were diverted to other freeways and to midday hours during the project. Excess fuel consumption was computed for vehicles idling at freeway entrance ramps and for slowdown and stop-and-go speed change cycles on both the freeway and city streets. In spite of the obvious attempt to include as many factors as possible, the model does not adjust for seasonal fluctuations in traffic volumes. Although local traffic experts generally agree that peak-period traffic volumes change during the summer in the Santa Monica Freeway corridor, there was simply not enough data available to derive seasonal conversion factors. Without such factors, it is impossible to separate the effect of the Diamond Lanes from the seasonal effect on fuel consumption during the Diamond Lane project. This is because the "before" period volume data was collected during winter and spring months and most of the project data was collected during the summer.

To help circumvent this difficulty, the fuel consumption rate (expressed as gallons of fuel per 1,000 vehicle-miles of travel) was computed for periods before, during and after the project. This measure reflects on-ramp idling and speed change cycles. Because it is relatively independent of traffic volumes, however, direct comparisons can be made of the impact of the Diamond Lanes on fuel consumption.

In addition, a marginal energy consumption analysis was performed. As outlined below, this exercise involves computing the average amount of fuel saved by people switching from automobiles to carpools and buses and comparing it to the extra fuel consumed by automobiles due to longer delays on entrance ramps and the more frequent slowdown and speed change cycles.

8.1.1 Corridor-Wide Energy Computations

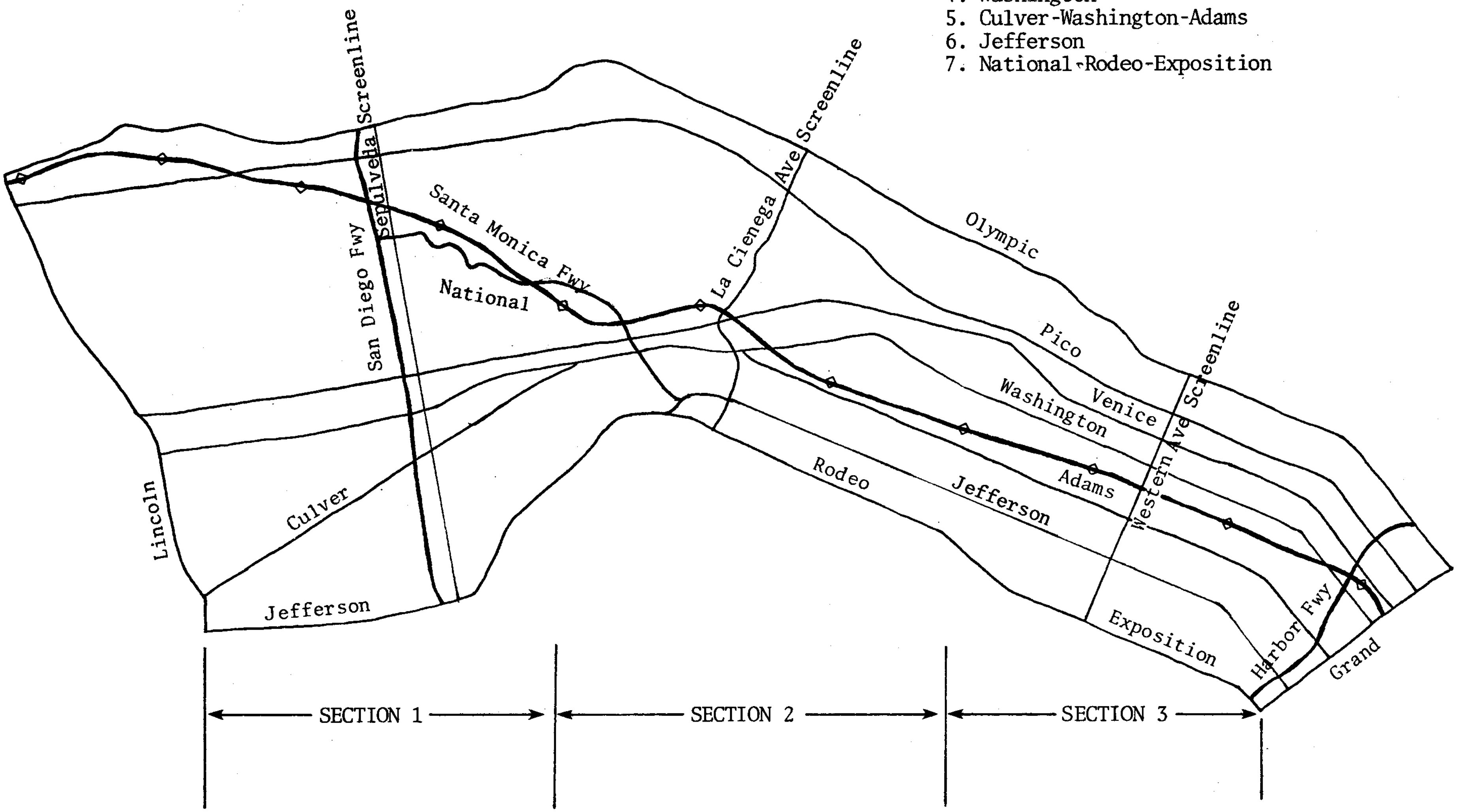
Input data for the energy consumption model consists of hourly traffic volume counts, average travel speeds, on-ramp wait times, and on-ramp volumes. The data collected during the 21-week project was separated into three periods corresponding to the first seven weeks, the middle seven weeks, and the last seven weeks. The east-west corridor was defined as the Santa Monica Freeway and seven parallel city street routes, as shown in Exhibit 8.1. The corridor

EXHIBIT 8.1

SANTA MONICA FREEWAY CORRIDOR

Parallel Surface Street Routes

1. Olympic
2. Pico
3. Venice
4. Washington
5. Culver-Washington-Adams
6. Jefferson
7. National-Rodeo-Exposition



was divided into three sections centered about the screenlines where data was collected. The data on each of these routes were categorized by corridor section, peak period (morning or evening) and direction of travel (eastbound or westbound).

The model estimates vehicle-miles of travel for each corridor route by multiplying the travel volumes by the distance spanned by the corresponding screenline section along that route and summing the results over all screenlines. This was repeated for each peak period and direction of travel. The results are tabulated in Table 8.1, averaged over both peak periods and directions of travel. As shown, the vehicle-miles per hour for the entire corridor dropped from 295,052 vehicle-miles/hour before the project to 275,679 vehicle-miles/hour during the early Diamond Lane period, a drop of 7%, and continued to decline during the middle and late periods, dropping 7% below pre-project levels by the last seven weeks of the project. However, after accounting for the diversion to midday hours and the shifts to other freeways, the drop observed during the project was much smaller. This total is listed in the bottom line of Table 8.1. An important point in terms of energy consumption is that vehicle-miles actually increased on all parallel city streets where the consumption rate is generally higher, and decreased on the Santa Monica Freeway. After the close of the project, estimates of the number of vehicle-miles/hour in the corridor indicated that this measure had increased by about 2.7% over pre-project levels.

The estimates of the shifts to other freeways outside the corridor were based on the Santa Monica Freeway Corridor Driver Survey. This license plate-based survey, conducted after the project termination, specifically asked respondents whether they had switched to other freeways while the Diamond Lanes were in effect. The amount of traffic diverted to midday hours was estimated from off-peak period volume counts taken at the three screenlines before and during the project. These counts indicated that some drivers whose travel times were flexible chose to make their trips during non-project operating hours to avoid possible peak-period congestion (see Section 5.8).

The model estimates cruising speed fuel consumption as a function of the average speed for each screenline section and corridor route. This method reflects the fact that automobile fuel efficiency varies with operating speed.

The cruising speed fuel consumption is calculated by multiplying the vehicle-miles traveled by the fuel consumption rate, which varies as a function of the average cruising speed. This computation was repeated for each section of all corridor routes by direction of travel and time of day. The average cruising speed fuel consumption per peak-hour -- averaged over both directions and both peak periods -- is displayed in Table 8.2. While the cruising speed fuel consumption decreased on the freeway during the Diamond Lane project, it increased on city streets

TABLE 8.1

AVERAGE VEHICLE MILES TRAVELED PER HOUR (M.P.H.)
FOR THE SANTA MONICA FREEWAY CORRIDOR
IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	AFTER
S.M. FREEWAY NON <> LANES	162549.100	123366.600	137758.500	137732.500	157742.200
S.M. FREEWAY DIAMOND LANE	0.000	8087.074	8230.238	9461.480	0.000
VENICE	21816.320	23818.870	23283.930	21547.250	20404.310
OLYMPIC	37714.980	41572.370	37906.390	34738.340	47249.910
PICO	21115.540	24412.700	20362.520	19498.850	22231.480
WASHINGTON	13667.760	13574.040	13219.670	11540.530	11429.850
CULVER - ADAMS	9357.227	10254.920	8701.480	8242.430	9839.758
JEFFERSON	11972.540	12636.450	15968.780	15450.940	15417.940
NATIONAL - RODEO - EXPO	16858.640	17956.340	17405.030	15505.960	18778.820
ALL S.M. FREEWAY LANES	162549.100	131453.600	145988.600	147194.000	157742.200
ALL PARALLEL CITY STREETS	132502.800	144225.500	136847.600	126524.100	145351.900
ENTIRE EAST-WEST CORRIDOR	295052.000	275679.100	282836.300	273718.100	303094.100
DIVERSION TO MIDDAY HOURS	0.000	3016.330	3016.330	3016.330	0.000
SHIFTS TO OTHER FREEWAYS	0.000	6159.840	6159.840	6159.840	0.000
CORRIDOR + DIVERSIONS	295052.000	284855.300	292012.400	282894.300	303094.100

TABLE 8.2

AVERAGE CRUISING SPEED FUEL CONSUMPTION PER HOUR (G.P.H.)
FOR THE SANTA MONICA FREEWAY CORRIDOR
IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD			AFTER
		EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	
S.M. FREEWAY NON <> LANES	8543.066	6394.723	7356.930	7222.496	8367.055
S.M. FREEWAY DIAMOND LANE	0.000	441.392	449.206	516.408	0.000
VENICE	1629.223	1790.355	1730.859	1601.480	1510.217
OLYMPIC	2770.399	3153.982	2883.305	2647.185	3563.754
PICO	1575.782	1869.432	1548.140	1471.167	1677.720
WASHINGTON	997.402	1030.740	996.374	863.475	833.375
CULVER - ADAMS	689.811	779.518	652.241	609.532	727.387
JEFFERSON	873.980	940.095	1189.604	1150.896	1194.199
NATIONAL - RODEO - EXPO	1242.910	1344.760	1305.956	1161.542	1461.457
ALL S.M. FREEWAY LANES	8543.066	6836.113	7806.133	7738.902	8367.055
ALL PARALLEL CITY STREETS	9779.500	10908.870	10306.500	9505.266	10968.100
ENTIRE EAST-WEST CORRIDOR	18322.560	17744.980	18112.640	17244.160	19335.160
DIVERSION TO MIDDAY HOURS	0.000	152.578	152.578	152.578	0.000
SHIFTS TO OTHER FREEWAYS	0.000	308.830	308.830	308.830	0.000
CORRIDOR + DIVERSIONS	18322.560	18206.390	18574.040	17705.570	19335.160

during the early and middle project periods. The balance is a reduction in cruising speed fuel consumption for the entire east-west corridor during the demonstration. This result holds even after adding in the diversions to midday hours and other freeways. However, it is extremely dependent upon the accompanying change in vehicle-miles of travel.

In addition to the fuel consumed by vehicles traveling at average cruising speeds, many opponents of the Diamond Lane project were understandably concerned about the extra energy consumed by vehicles that experienced longer delays at freeway entrance ramps and more frequent speed changes on both the freeway and city streets.

To incorporate the effect of speed change cycles on energy consumption, the speed run data were sampled to estimate the number of stop-and-go cycles and slowdown speed changes for each corridor route before and during the project.* The methodology developed by Paul Claffey[1] was programmed to determine the excess fuel consumption due to these factors as well as for vehicles idling at entrance ramps. The average on-ramp wait times and traffic volumes were multiplied by an idling fuel consumption rate for all metered on-ramps where data were collected. The fuel consumed at the on-ramps was added to the Santa Monica Freeway non-Diamond Lane cruising speed fuel consumption to develop estimates of the total fuel consumption. The average excess energy consumption generated by both idling and speed change cycles, summed over all sections of the corridor and both directions of travel and averaged over both peak periods, is tabulated in Table 8.3. As shown, excess fuel consumption due to slowdown and stop-and-go conditions dropped on the freeway but rose on all surface streets. The reason that the excess fuel consumption was lower on the freeway is that the vehicle-miles traveled by non-carpool vehicles dropped by approximately 24% on the freeway during the early stage of the Diamond Lane demonstration. However, this drop resulted in only a 9% reduction in excess energy consumption, so that individual non-carpool vehicles were actually consuming more energy for speed changes and on-ramp delays. In other words, the energy consumed by non-carpoolers in speed changes and ramp delays increased on a per-vehicle-mile basis during the Diamond Lane project.

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*The sample size for the speed change cycles was relatively small because it is an extremely time-consuming process to record each speed change by the original speed and ending speed after acceleration. Furthermore, considering the accuracy of the other data, pinpoint accuracy in this case would not have altered the basic results, since the excess energy consumed due to these factors is small when compared to the total energy consumption

TABLE 8.3

AVERAGE EXCESS ENERGY CONSUMPTION RATE (G.P.H.)
FOR SLOW-DOWN AND STOP-GO CYCLES AND IDLING AT METERED ONRAMPS
FOR THE SANTA MONICA FREEWAY CORRIDOR
IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD			AFTER
		EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	
S.M. FREEWAY NON <> LANES	887.199	803.644	892.987	840.943	912.755
S.M. FREEWAY DIAMOND LANE	0.000	0.000	0.000	0.000	0.000
VENICE	468.023	657.215	626.382	593.724	495.847
OLYMPIC	873.858	1170.266	1066.055	974.495	791.695
PICO	374.992	511.991	422.197	397.719	381.533
WASHINGTON	461.532	589.487	568.069	497.575	375.143
CULVER - ADAMS	401.910	541.236	458.915	435.143	449.809
JEFFERSON	224.452	261.027	333.933	324.930	295.546
NATIONAL - RODEO - EXPO	582.991	745.421	696.934	643.152	676.576
ALL S.M. FREEWAY LANES	887.199	803.644	892.987	840.943	912.755
ALL PARALLEL CITY STREETS	3387.759	4476.641	4172.464	3866.737	3466.148
ENTIRE EAST-WEST CORRIDOR	4274.957	5280.281	5065.469	4707.676	4378.902

Even though the excess energy per vehicle-mile increased because of longer ramp delays and more frequent speed change cycles, the total excess energy consumed on the freeway had declined by the last seven weeks of the project. However, on city streets, both the vehicle-miles of travel and the excess energy consumed per vehicle-mile increased.

The average total energy consumption per peak hour is tabulated by corridor route in Table 8.4. This table includes excess fuel consumed for slowdown and stop cycles and idling at metered on-ramps, and the cruising speed fuel consumption. The consumptions were averaged over both peak periods and both directions of travel. The results indicate a reduction in fuel consumption on the Santa Monica Freeway during the Diamond Lane project. At the same time, fuel consumption actually increased on all parallel city street routes that were sampled. The net effect for the entire east-west corridor was a slight increase of between 500 and 600 gallons per hour during the early and middle Diamond Lane periods, followed by a decrease during the late period. However, after conservatively accounting for diversions to midday hours and shifts to other freeways, the total energy consumption during the early and middle periods is greater than the pre-project level of 22,598 gallons per hour.

By the end of the project, the balance sheet shows a net fuel savings of 185 gallons per peak hour for the entire east-west corridor, plus diversions outside the corridor. On a yearly basis, this is equivalent to approximately 336,700 gallons. If diversions are excluded and only the east-west corridor is considered, the net savings was 646 gallons per hour, or 1.2 million gallons annually by the end of the project.

Thus, at the time the project was terminated, it appears that it was successful in reducing energy consumption at an annual rate of about 336,700 gallons. However, this is only about .8% of the estimated 41 million gallons consumed each year by motorists in the Santa Monica Freeway corridor during peak hours. The energy consumption rate computed by dividing the total energy consumption per hour by the vehicle-miles of travel per hour is tabulated in Table 8.5. Even though total vehicle-mileage in the corridor decreased, the energy consumption rate increased on every corridor route during the project and returned to approximately the pre-project level after the Diamond Lanes were terminated. This happened because travel speeds were generally lower, speed changes were more frequent, and ramp delays were longer during the project. Each of these factors tended to decrease fuel consumption efficiency. The consumption factors shown in Table 8.5 list the energy rates in gallons per 1,000 vehicle-miles. Expressed in terms of miles per gallon, the consumption rate on the freeway averaged about 17 miles per gallon compared to about 12 miles per gallon on city streets.

TABLE 8.4

AVERAGE ENERGY CONSUMPTION PER HOUR (G.P.H.) INCLUDING EXCESS FUEL FOR SLOWDOWN AND STOP-GO CYCLES AND IDLING AT METERED ONRAMPS FOR THE SANTA MONICA FREEWAY CORRIDOR IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD			AFTER
		EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	
S.M. FREEWAY NON <> LANES	9430.262	7198.359	8249.910	8063.430	9279.805
S.M. FREEWAY DIAMOND LANE	0.000	441.392	449.206	516.407	0.000
VENICE	2097.245	2447.568	2357.240	2195.202	2006.063
OLYMPIC	3644.255	4324.246	3949.359	3621.678	4355.445
PICO	1950.773	2381.421	1970.335	1868.884	2059.251
WASHINGTON	1458.934	1620.226	1564.443	1361.050	1208.518
CULVER - ADAMS	1091.721	1320.754	1111.156	1044.675	1177.196
JEFFERSON	1098.432	1201.122	1523.536	1475.824	1489.744
NATIONAL - RODEO - EXPO	1825.900	2090.179	2002.929	1804.692	2138.031
ALL S.M. FREEWAY LANES	9430.262	7639.750	8699.113	8579.836	9279.805
ALL PARALLEL CITY STREETS	13167.250	15385.500	14478.980	13371.990	14434.250
ENTIRE EAST-WEST CORRIDOR	22597.500	23025.230	23178.080	21951.810	23714.030
DIVERSION TO MIDDAY HOURS	0.000	152.578	152.578	152.578	0.000
SHIFTS TO OTHER FREEWAYS	0.000	308.830	308.830	308.830	0.000
CORRIDOR + DIVERSIONS	22597.500	23486.640	23639.450	22413.220	23714.030

TABLE 8.5

AVERAGE ENERGY CONSUMPTION RATE (GALLONS/1000 VEHICLE-MILES) INCLUDING EXCESS FUEL FOR SLOWDOWN AND STOP-GO CYCLES AND IDLING AT METERED ONRAMPS FOR THE SANTA MONICA FREEWAY CORRIDOR IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD			AFTER
		EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	
S.M. FREEWAY NON <> LANES	58.015	58.349	59.887	58.544	58.829
S.M. FREEWAY DIAMOND LANE	0.000	54.580	54.580	54.580	0.000
VENICE	96.132	102.758	101.239	101.878	98.316
OLYMPIC	96.626	104.017	104.187	104.256	92.179
PICO	92.386	97.548	96.763	95.846	92.628
WASHINGTON	106.743	119.362	118.342	117.936	105.733
CULVER - ADAMS	116.671	128.792	127.697	126.743	119.637
JEFFERSON	91.746	95.052	95.407	95.517	96.624
NATIONAL - RODEO - EXPO	108.306	116.403	115.077	116.387	113.853
ALL S.M. FREEWAY LANES	58.015	58.117	59.588	58.289	58.829
ALL PARALLEL CITY STREETS	99.373	106.677	105.804	105.687	99.306
ENTIRE EAST-WEST CORRIDOR	76.588	83.522	81.949	80.199	78.240

8.1.2 Marginal Energy Consumption

A rough marginal energy analysis was undertaken to estimate the average energy savings attributable to each person who switched to a bus or carpool and the excess energy consumed by each non-carpooling automobile during the project. It was estimated that each solo driver switching to a carpool saved an average of 1.15 gallons per one-way trip, or 11.5 gallons per week. This calculation assumes an average one-way trip distance of 24.4 miles for a 3.4-person carpool, and includes an allowance to account for the extra use of automobiles left at home by carpoolers. Figures supporting these estimates were based on Diamond Lane occupancy counts and the information obtained in the corridor driver survey. In the survey, carpoolers were asked whether or not the cars left at home were actually driven and, if so, how many miles per day. The average number of miles the cars left at home were driven per day was converted to a fuel consumption estimate and deducted from the incremental energy savings for carpools.

Similarly, the average energy saving per one-way trip for single automobile drivers who switched to buses during the project was estimated to be approximately 1.10 gallons, or 11 gallons per week. (This is roughly the same as the amount saved by each driver who switched to a carpool. Although buses were more energy-efficient than carpools, the average trip length of bus users was shorter than that reported by carpoolers, so that carpoolers saved proportionally more fuel by leaving their automobiles at home.) This figure was estimated by computing the total fuel consumption by project buses before the project and for each period during the project. The incremental bus fuel consumption rate was then obtained by subtracting the amount before from the consumption during and dividing by the increase in bus passengers during the project. Finally, the average amount of fuel consumed per one-way trip by automobiles before the project was subtracted to obtain the average saving for each person who switched to a bus during the project.

As a result of increased congestion and longer idling time at freeway on-ramps, the energy consumed by non-carpoolers increased during the Diamond Lane project. One estimate of the average increase imposed on each non-carpooler could be formulated by comparing the appropriate energy consumption rates displayed in Table 8.5 before and during the Diamond Lane project. Table 8.6 displays the average energy consumption rate for the same routes included in the energy analysis.

TABLE 8.6

AVERAGE ENERGY CONSUMPTION RATES

IN GALLONS/1,000 VEHICLE-MILES

(Both Directions, Both Peak Periods)

	Before	During ◇ Lane			After
		Early ◇ Lane	Middle ◇ Lane	Late ◇ Lane	
All East-West Corridor Routes	76.59	83.52	81.85	80.20	78.24
All Routes Except ◇ Lanes	76.59	84.40	82.77	81.12	78.24
Increase Over Before Period (Non-Carpool Routes)	---	7.81	6.18	4.53	1.65
Percent Increase	---	10.20%	8.07%	5.91%	2.15%

As shown, the average energy consumption rate for non-carpoolers in the corridor increased by about 10% early in the project period. By the last seven weeks, the average non-carpooler traveling over the sample corridor routes was using 6% more gasoline than he had used prior to the project. For a non-carpooler traveling 20 miles daily in the corridor, this increase would have amounted to an additional half-gallon of gasoline per week.

By the end of the project, the estimates indicate that the energy savings realized by drivers switching to buses and carpools was sufficient to offset the increases in energy consumption imposed on non-carpoolers by increased congestion and idling time. Thus, it appears that the Diamond Lanes were successful in achieving at least one of their objectives, namely reducing energy consumption. Even though the reduction in energy consumption at the time the project was terminated represents a small part (0.8%) of the total, energy consumption had reached the marginal point at which small additional shifts to buses and carpools would have resulted in much greater savings, since the increase imposed on the non-carpooling public had already been offset.

8.2 AIR QUALITY

8.2.1 Theoretical Air Quality Computations

The energy computer model described above was also programmed to compute the theoretical air quality burden in the Santa Monica Freeway corridor based on vehicle-miles of travel and average travel speeds. The amount of carbon monoxide (CO) emitted was computed as a surrogate for air quality. CO emission factors, which vary as a function of travel speed, were programmed for both the freeway and for city streets. To the extent that these factors, based on typical roadway conditions, reflect various curves, grades, stops per mile and traffic densities, the model accounts for changes in air quality due to slower speeds and more slowdown cycles. The emission factors corresponding to the average travel speeds were applied to the vehicle-miles of travel on each corridor route by direction of travel and time of day. In addition, the amount of CO emitted by vehicles idling at metered entrance ramps was computed and added to the Santa Monica Freeway emissions.

The results, summed over both directions of travel and averaged over both peak periods, are shown in Table 8.7, expressed as tons of CO emitted per hour. While the CO emissions declined on the freeway, they increased on all measured surface routes during the early and middle Diamond Lane project periods. By the late Diamond Lane period, the calculated emissions on all corridor routes during the peak hours actually fell below pre-project levels. When diversions to other time periods and freeways were considered, however, total emissions during the last seven weeks of the project were roughly equal to pre-project levels. Once lane restrictions were removed, pollutant emissions rose above pre-project levels. However, these results are extremely dependent on the vehicle-miles of travel, and it is impossible to separate the effect of the Diamond Lanes from seasonal changes in traffic volumes.

8.2.2 Measured Air Quality Data Evaluation

Evaluating the impact of the Diamond Lanes on air quality is an even more difficult problem than evaluating energy consumption. The primary reason is that air quality varies tremendously with wind speed and direction and local atmospheric stability, as well as vehicle-miles of travel. Thus, while pollutant emissions may be theoretically computed as a function of vehicle-miles, the measured impact of those emissions will vary considerably with local climactic conditions.

CALTRANS collected air quality data along the freeway and on city streets before, during and after the Diamond Lane project. Air quality was sampled at sites alongside the freeway and surface streets in the corridor. Exhibit 8.2 identifies the sampling sites as well as the location of the mechanical weather stations used to record meteorological conditions. However, there is a great deal of uncertainty about whether the air quality impact of such a geographically-specific traffic project can be measured. From a statistical viewpoint, such measurements require that all other conditions remain constant or can be accounted for. This is rarely true or possible from a meteorological point of view.

The difficulty in analyzing the air quality data that was collected is (1) identifying whether changes have occurred, and (2) if they have occurred, identifying the cause of the change.

TABLE 8.7

AVERAGE AIR QUALITY BURDEN (TONS OF CO/ HOUR)
INCLUDING ALLOWANCES FOR DIFFERENT SPEEDS
AND FOR IDLING AT METERED ONRAMPS
FOR THE SANTA MONICA FREEWAY CORRIDOR
IN BOTH DIRECTIONS DURING BOTH PEAK PERIODS

CORRIDOR ROUTE	BEFORE	DIAMOND LANE PROJECT PERIOD			AFTER
		EARLY <> LANE	MIDDLE <> LANE	LATE <> LANE	
S.M. FREEWAY NON <> LANES	6.736	5.952	5.722	5.873	6.617
S.M. FREEWAY DIAMOND LANE	0.000	0.285	0.290	0.333	0.000
VENICE	1.400	1.556	1.446	1.313	1.253
OLYMPIC	2.220	2.775	2.563	2.380	3.083
PICO	1.324	1.682	1.368	1.280	1.456
WASHINGTON	0.806	0.907	0.862	0.739	0.672
CULVER - ADAMS	0.569	0.686	0.555	0.507	0.609
JEFFERSON	0.714	0.809	1.027	0.993	1.103
NATIONAL - RODEO - EXPO	1.039	1.171	1.142	1.012	1.366
ALL S.M. FREEWAY LANES	6.736	6.237	6.011	6.206	6.617
ALL PARALLEL CITY STREETS	8.071	9.587	8.963	8.225	9.543
ENTIRE EAST-WEST CORRIDOR	14.808	15.824	14.974	14.431	16.161
DIVERSION TO MIDDAY HOURS	0.000	0.134	0.134	0.134	0.000
SHIFTS TO OTHER FREEWAYS	0.000	0.282	0.282	0.282	0.000
CORRIDOR + DIVERSIONS	14.808	16.240	15.389	14.846	16.161

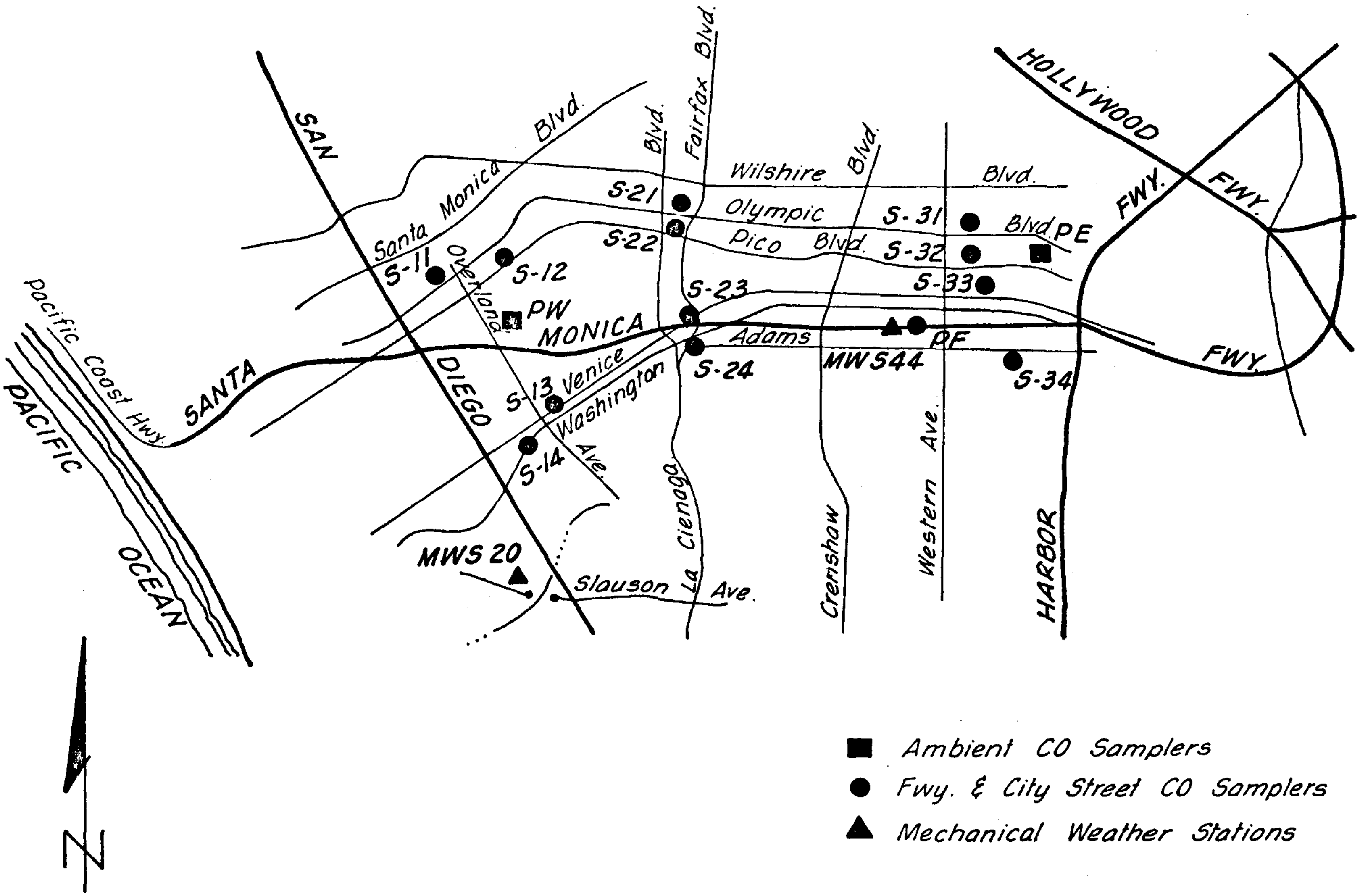

EXHIBIT 8.2: LA-10 DIAMOND LANE AIR SAMPLING LOCATIONS

(Source: CALTRANS District 07)

In the case of the Diamond Lane project, "before" and "after" air quality data reflected different seasons and different weather conditions, making it difficult to isolate the effects of the lanes themselves. Statistically, this difficulty manifests itself in the selection of adequate sample sizes. The sampling procedures outlined in the evaluation plan[9] incorporated the procedures normally used by CALTRANS.

The data collected prior to the project were analyzed to check the validity of these sample sizes. This preliminary analysis indicated that, because of the wide variations in meteorological conditions, sample sizes collected during the demonstration were insufficient to support statistically significant results. To make the most of the data collected, CALTRANS undertook a detailed analysis of the available data in an attempt to account for widely varying meteorological conditions. To aid in the analysis, CALTRANS contracted Dr. L.O. Myrup, a meteorologist from the University of California at Davis. Dr. Myrup developed a methodology[10] to normalize the air quality measurements to correct for changes in meteorological variability. This methodology was subsequently implemented by Rudolf Hendriks of CALTRANS District 07,[11] who translated Dr. Myrup's procedures into usable equations applicable to the raw data collected in the Santa Monica Freeway corridor.

Typically, the effect of changes in the transportation system on air pollution are small in comparison to the variation caused by meteorological conditions. Dr. Myrup's procedure, as implemented by Mr. Hendriks, accounts for two primary sources of meteorological variability: (1) changes in wind speed and direction over time and space; and (2) changes in local atmospheric stability. Following these procedures, CALTRANS prepared summaries of the normalized concentrations of carbon monoxide, the principal air pollutant, for winds parallel to the roadway and for winds across the roadway. These summaries appear in Tables 8.8 and 8.9. The normalized air quality statistics contained in these tables reflect a general reduction in carbon monoxide levels at the corridor measuring stations during the Diamond Lane project. With the samples normalized for aggregation, statistically significant reductions in carbon monoxide levels were recorded in the vicinity of the Western Avenue screenline on both the freeway and adjacent city streets for nearly all categories of wind direction and stability. Mixed results were obtained at the screenlines along La Cienega and Sepulveda Boulevards. Although there was a general trend toward lower carbon monoxide levels for these more westerly screenlines, measured changes in roadway carbon monoxide concentrations were often statistically insignificant. Moreover, in one instance early in the project, a statistically significant increase in carbon monoxide levels was recorded along the Sepulveda Boulevard screenline.

The general trend in measured air quality levels showed a decrease in carbon monoxide concentrations near corridor roadways during the Diamond Lane project. In view of the small sample sizes, seasonal changes, and analytic uncertainties, however, it is impossible to make conclusive statements regarding the impact of the Diamond Lanes on air quality.

TABLE 8.8

SUMMARY OF NORMALIZED CARBON MONOXIDE CONCENTRATIONS (PARTS PER MILLION) FOR WINDS ACROSS THE ROADWAY

SITE/SCREENLINE	STABILITY CLASS	BEFORE ◇ LANE 2/3/76 TO 3/12/76			DURING ◇ LANE (EARLY PERIOD: 4/1/76 TO 5/14/76)						DURING ◇ LANE (LATE PERIOD: 5/17/76 TO 8/13/76)						AFTER ◇ LANE (8/16/76 TO 10/22/76)					
					CONCENTRATION			CHANGE			CONCENTRATION			CHANGE			CONCENTRATION			CHANGE		
		TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT
Western Avenue (S-1)	ALL	(58) 9.2	5.5	3.7	(114) 6.5	3.3	3.2	-2.7	-2.2 Y	-0.5	(90) 7.2	3.9	3.3	-2.0	-1.6 Y	-0.4	(162) 8.7	3.1	5.6	-0.5	-2.4 Y	+1.9
	STABLE	(11) 9.0	4.2	4.8	(4)* —	—	—	—	—	—	(0) —	—	—	—	—	—	(23) 10.0	1.7	8.3	+1.0	-2.5 Y	+3.5
	NEUTRAL	(22) 10.8	7.2	3.6	(54) 7.6	3.8	3.8	-3.2	-3.4 Y	+0.2	(27) 8.7	5.2	3.5	-2.1	-2.0 Y	-0.1	(59) 8.9	3.0	5.9	-1.9	-4.2 Y	+2.3
	UNSTABLE	(25) 7.7	4.6	3.1	(56) 5.4	2.8	2.6	-2.3	-1.8 Y	-0.5	(53) 6.5	3.3	3.2	-1.2	-1.3 Y	+0.1	(80) 8.1	3.1	5.0	+0.4	-1.5 Y	+1.9
La Cienega Blvd. (S-2)	ALL	(63) 12.2	8.0	4.2	(145) 9.4	6.1	3.3	-2.8	-1.9 Y	-0.9	(109) 11.1	7.6	3.5	-1.1	-0.4 N	-0.7	(142) 11.2	6.0	5.2	-1.0	-2.0 Y	+1.0
	STABLE	(13) 13.9	7.6	6.3	(4)* —	—	—	—	—	—	(0) —	—	—	—	—	—	(24) 14.6	8.3	6.3	+0.7	+0.7 N	NC
	NEUTRAL	(26) 14.3	10.9	3.4	(69) 9.1	6.0	3.1	-5.2	-4.9 Y	-0.3	(32) 8.3	5.0	3.3	-6.0	-5.9 Y	-0.1	(32) 10.5	5.9	4.6	-3.8	-5.0 Y	+1.2
	UNSTABLE	(24) 9.0	4.9	4.1	(72) 9.7	6.3	3.4	+0.7	+1.4 Y	-0.7	(77) 12.4	8.7	3.7	+3.4	+3.8 Y	-0.4	(86) 10.6	5.5	5.1	+1.6	+0.6 N	+1.0
Sepulveda Blvd. (S-3)	ALL	(106) 10.9	6.6	4.3	(114) 12.7	9.5	3.2	+1.8	+2.9 Y	-1.1	(75) 10.3	6.9	3.4	-0.6	+0.3 N	-0.9	(95) 11.8	6.7	5.1	+0.9	+0.1 Y	+0.8
	STABLE	(19) 14.3	8.6	5.7	(4)* —	—	—	—	—	—	(4)* —	—	—	—	—	—	(19) 9.0	2.4	6.6	-5.3	-6.2 N	+0.9
	NEUTRAL	(25) 8.5	4.6	3.9	(11) 7.2	4.9	2.3	-1.3	+0.3 N	-1.6	(4)* —	—	—	—	—	—	(15) 14.5	9.5	5.0	+6.0	+4.9 Y	+1.1
	UNSTABLE	(62) 10.9	6.8	4.1	(99) 13.4	10.3	3.1	+2.5	+3.5 Y	-1.0	(67) 11.0	7.6	3.4	+0.1	+0.8 N	-0.7	(61) 12.0	7.4	4.6	+1.1	+0.6 N	+0.5
Santa Monica Freeway (PF)	ALL	(67) 18.4	13.9	4.5	(90) 15.7	12.1	3.6	-2.7	-1.8 Y	-0.9	(70) 14.5	10.5	4.0	-3.9	-3.4 Y	-0.5	(117) 17.3	11.5	5.8	-1.1	-2.4 Y	+1.3
	STABLE	(11) 21.8	15.9	5.9	(2)* —	—	—	—	—	—	(2)* —	—	—	—	—	—	(13) 21.1	11.3	9.8	-0.7	-4.6 Y	+3.9
	NEUTRAL	(27) 15.6	11.8	3.8	(26) 12.9	9.9	3.0	-2.7	-1.9 N	-0.8	(6)* —	—	—	—	—	—	(20) 14.4	9.4	5.0	-1.2	-2.4 N	+1.2
	UNSTABLE	(29) 19.6	15.3	4.3	(62) 17.0	13.3	3.7	-2.6	-2.0 Y	-0.6	(62) 15.4	11.3	4.1	-4.2	-4.0 Y	-0.2	(84) 17.4	12.1	5.3	-2.2	-3.2 Y	+1.0

( ) Amount of data in this category
* Not enough data for conclusive results
Y Roadway CO change significant at .05 level
N Roadway CO change not significant at .05 level

(Source: CALTRANS District 07 Environmental Investigations Branch)

TABLE 8.9

SUMMARY OF CARBON MONOXIDE CONCENTRATIONS (PARTS PER MILLION) FOR WINDS PARALLEL TO THE ROADWAY

SITE/SCREENLINE	WIND SPEED	BEFORE ◇ LANE 2/3/76 TO 3/12/76			DURING ◇ LANE (EARLY PERIOD: 4/1/76 TO 5/14/76) CONCENTRATION			CHANGE		
		TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT
Western Avenue (S-1)	ALL	(18) 13.8	7.5	6.3	(74) 7.2	2.7	4.5	-6.6	-4.8 Y	-1.8
	2-3 MPH	(9) 17.1	11.2	5.9	(37) 8.6	3.0	5.6	-8.5	-8.2 Y	-0.3
	4 MPH	(9) 10.5	3.8	6.7	(37) 5.7	2.3	3.4	-4.8	-1.5 Y	-3.3
La Cienega Blvd. (S-2)	ALL	(21) 7.3	3.0	4.3	(66) 6.3	2.5	3.8	-1.0	-0.5 Y	-0.5
	2-3 MPH	(8) 7.1	3.6	3.5	(39) 6.4	2.4	4.0	-0.7	-1.2 N	+0.5
	4 MPH	(13) 7.5	2.6	4.9	(27) 6.3	2.7	3.6	-1.2	+0.1 N	-1.3
Sepulveda Blvd. (S-3)	ALL	(32) 9.5	3.4	6.1	(67) 7.6	3.1	4.5	-1.9	-0.3 N	-1.6
	2-3 MPH	(29) 9.9	3.6	6.3	(58) 8.0	3.7	4.3	-1.9	+0.1 N	-2.0
	4 MPH	(3)* —	—	—	(9) 5.0	2.6	2.4	—	—	—
Santa Monica Freeway (PF)	ALL	(39) 15.4	9.1	6.3	(50) 10.2	5.5	4.7	-5.2	-3.6 Y	-1.6
	2-3 MPH	(31) 16.2	9.5	6.7	(39) 10.3	5.3	5.0	-5.9	-4.2 Y	-1.7
	4 MPH	(7) 11.1	6.7	4.4	(11) 9.9	6.2	3.7	-1.2	-0.5 N	-0.7

SITE/SCREENLINE	WIND SPEED	DURING ◇ LANE (LATE PERIOD: 5/17/76 TO 8/13/76) CONCENTRATION			CHANGE			AFTER ◇ LANE (8/16/76 TO 10/22/76) CONCENTRATION			CHANGE		
		TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT	TOTAL	ROADWAY	AMBIENT
Western Avenue (S-1)	ALL	(51) 6.5	3.1	3.4	-7.3	-4.4 Y	-2.9	(55) 8.7	2.6	6.1	-5.1	-4.9 Y	-0.2
	2-3 MPH	(37) 6.2	3.0	3.2	-10.9	-8.2 Y	-2.7	(21) 9.8	2.6	7.2	-7.3	-8.6 Y	+1.3
	4 MPH	(14) 7.1	3.4	3.7	-3.4	-0.4 N	-3.0	(34) 8.0	2.6	5.4	-2.5	-1.2 Y	-1.3
La Cienega Blvd. (S-2)	ALL	(59) 7.3	3.2	4.1	NC	+0.2 N	-0.2	(82) 9.9	4.0	5.9	+2.6	+1.0 Y	+1.6
	2-3 MPH	(47) 7.3	3.1	4.2	+0.2	-0.5 N	+0.7	(56) 10.5	4.2	6.3	+3.4	+0.6 N	+2.8
	4 MPH	(12) 7.4	3.4	4.0	+0.1	+0.8 Y	-0.9	(26) 8.7	3.5	5.2	+1.2	+0.9 N	+0.3
Sepulveda Blvd. (S-3)	ALL	(51) 6.8	2.8	4.0	-2.7	-0.6 Y	-2.1	(78) 9.6	3.1	6.5	+0.1	-0.3 N	+0.4
	2-3 MPH	(41) 7.1	3.1	4.0	-2.8	-0.5 N	-2.3	(64) 9.9	3.1	6.8	NC	-0.5 N	+0.5
	4 MPH	(10) 5.7	1.7	4.0	—	—	—	(14) 8.2	3.1	5.1	—	—	—
Santa Monica Freeway (PF)	ALL	(42) 10.7	5.5	5.2	-4.7	-3.6 Y	-1.1	(44) 12.2	5.3	6.9	-3.2	-3.8 Y	+0.6
	2-3 MPH	(36) 11.1	5.6	5.5	-5.1	-3.9 Y	-1.2	(44) 12.2	5.3	6.9	-4.0	-4.2 Y	+0.2
	4 MPH	(6) 8.2	4.8	3.4	-2.9	-1.9 N	-1.0	(0) —	—	—	—	—	—

( ) Amount of data in this category
* Not enough data for conclusive results
Y Roadway CO change significant at .05 level
N Roadway CO change not significant at .05 level

(Source: CALTRANS District 07 Environmental Investigations Branch)

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9. WHAT HAPPENED OFF THE FREEWAY

The Diamond Lane experience was not limited to riding on the Santa Monica Freeway. This chapter describes the environment within which the Diamond Lane project occurred and some of the influences affecting the project, apart from the technical aspects of freeway operation. No project statistics can fully convey the chaotic environment within which this project operated. The whole is more than the sum of the parts described in this chapter: the media, public response, legal issues, and political and institutional climate. One local participant stated that to really understand "what's going on down here, one needs to be here to experience the state of siege that exists."

The first section concerns the communication of the project and traces the coverage by the media: newspapers, other press, radio and television, as well as the project planners' promotion program to reach their audience. The second section describes various public responses to the project; the third section, the legal issues raised; the fourth section, the political and institutional climate which existed during the project, and the final sections summarize the situation to date and other evaluations.

9.1 MEDIA COMMUNICATION

"It's a flop": County Supervisor Hahn on opening day.

"It's a bureaucratic boondogle": Los Angeles City Councilman Yaroslavsky, March 23.

"I thought it was dead": State Secretary of Business and Transportation Donald Burns, quoted in the Los Angeles Times, April 1.

"Patience...Patience": Los Angeles Times editorial, April 7.

"One if by land, two if by sea, and three if by diamond lane": Steve Fox, Channel 9 News, May 13.

"Only a bureaucracy as mulishly obstinate as Caltrans would have continued it this long.": Los Angeles Times editorial, "A Total Flop," June 11.

"Given the massive assault since the start of the project, it has performed remarkably well.": State Director of Transportation Gianturco, June 24.

"I think it's become a media event....": Director Gianturco, July 21.

"There's new news from the people who brought you the Diamond Lanes...": newscaster after project termination, Fall 1976.

If these quotes leave the reader with the impression that the Diamond Lane project was not well received in the Los Angeles area media, the reader probably would reach the same conclusion if exposed to the entire, voluminous media coverage. A great many Californians, and others, when asked about the Diamond Lane on the Santa Monica Freeway, recall it as the project that caused so much trouble in Los Angeles. Clearly, from the pounds of press materials, the project was not publicity-shy; it was publicized after opening day (Mad Monday) not only in the local newspapers and on radio and television, but also worked its way into the State and national press. The project inspired banners, badges, slogans, cartoons and even a song, "Driving Down the Lane with Diamonds" (see samples in Exhibit 9.1).

The predominantly negative view of the project transferred to other areas. The Los Angeles Police Chief urged Governor Brown in August not to sign a "bill of rights" for law enforcement officers, referring to the bill as a "blue Diamond Lane for cops," implying it would give preferential treatment to officers over civilian department employees.

The following numbers and graphs associated with media coverage are not to be viewed as being statistically important, but as an effort to illustrate that the project was seldom out of the public view and when in view, it was treated as an eyesore.

In five months, March through August, the local media coverage included: 52 radio, television, and newspaper editorials; 10 radio and television commentaries; 13 radio and television editorial replies; and 21 interviews with project personalities. The distribution of media coverage, beginning on March 15, is shown in Exhibit 9.2 and, in addition to the editorial content, includes 397 radio/television reports and 203 newspaper articles from the local press. The following sections will examine the coverage of the newspapers (9.1.1), other press (9.1.2), radio and television (9.1.3), and the project promotional and marketing plan carried out by the agencies sponsoring the project (9.1.4).

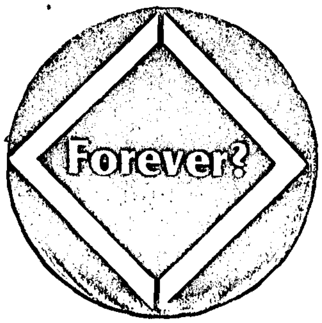
9.1.1 Local Newspaper Coverage*

This section examines newspaper coverage: the opening days of the project; the editorials; the articles; and the cartoons.

The major newspaper dailies in Los Angeles covering the project were the morning Los Angeles Times, the afternoon Los Angeles

*CALTRANS provided copies of local press articles to SYSTAN from a clipping service they subscribed to during the project. In addition, SYSTAN followed the Los Angeles Times daily and gathered State and national press reaction.

EXHIBIT 9.1: SAMPLES OF DIAMOND LANE TRAPPINGS



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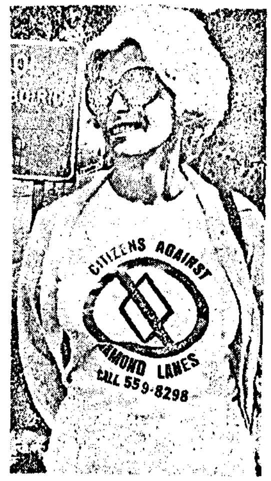
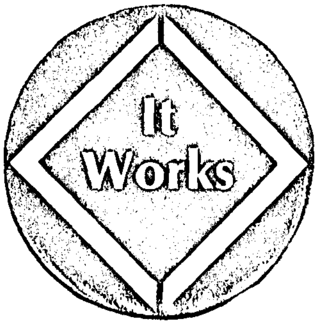
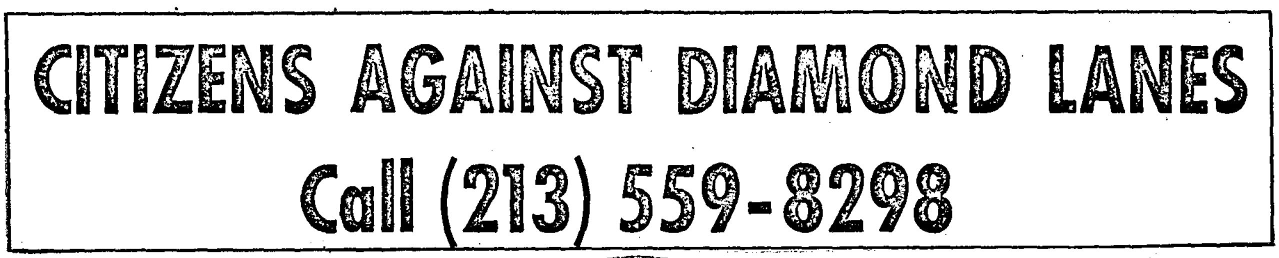
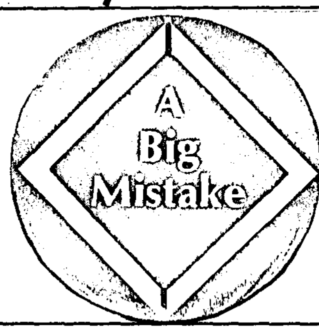
Buttons will be rushed first class mail or UPS







(Bumper Sticker)



(Bumper Sticker)

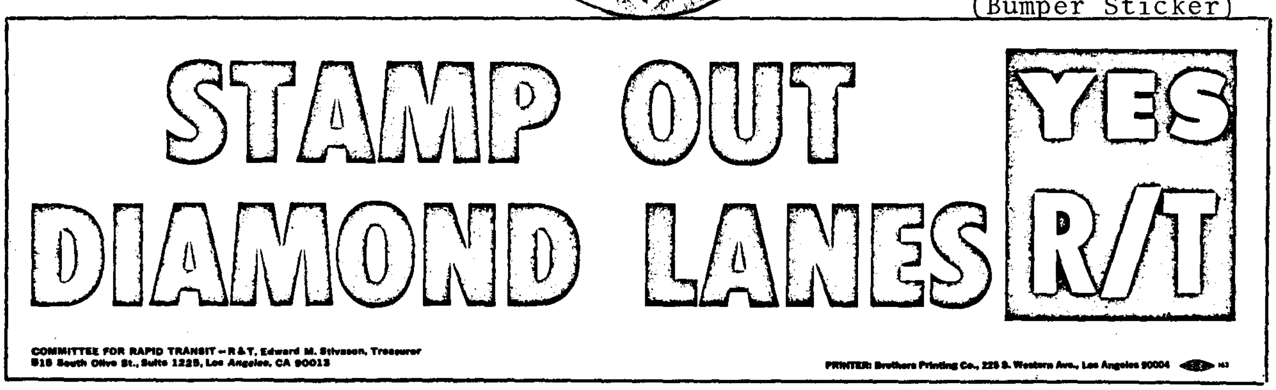
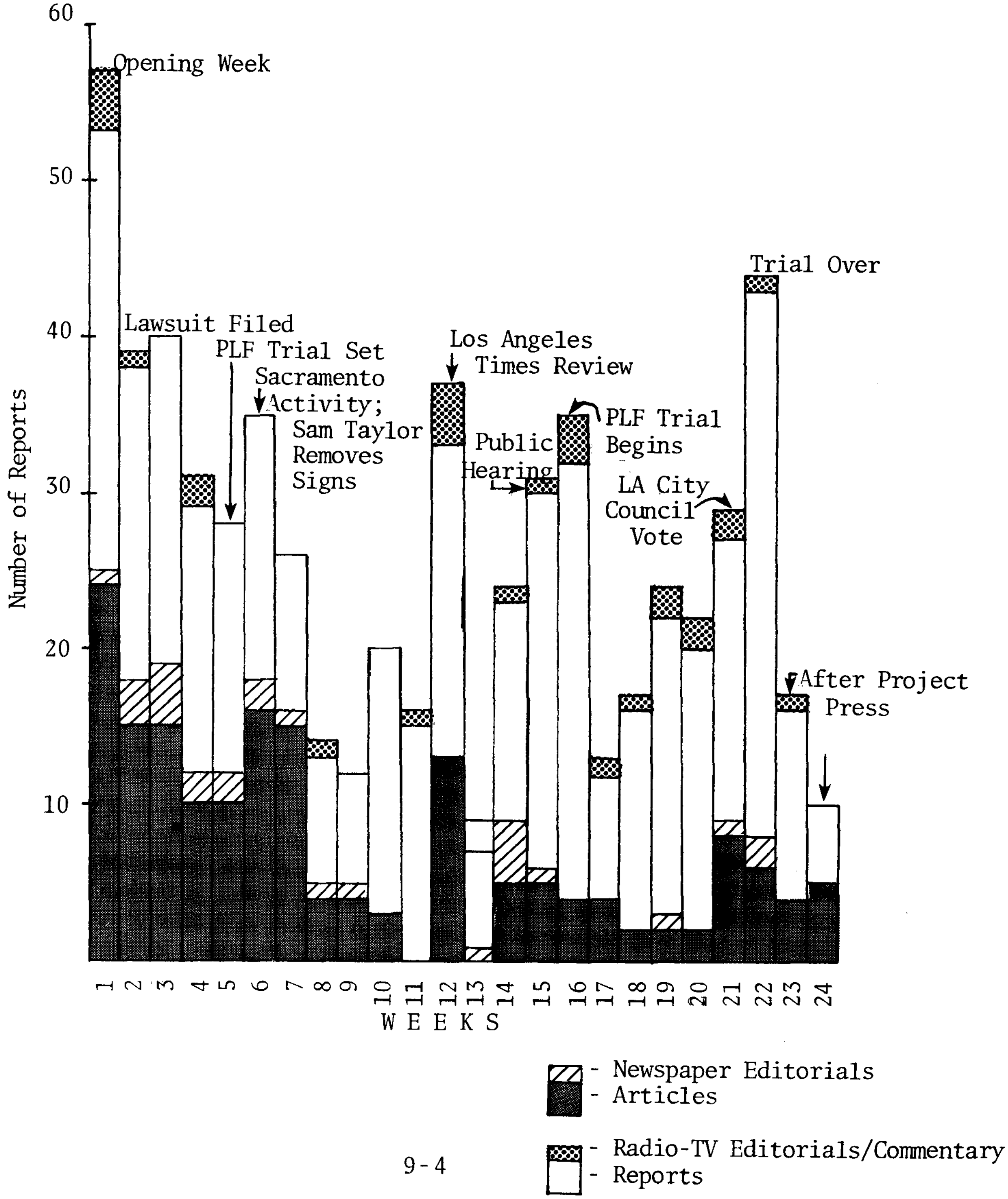


EXHIBIT 9.2

PROJECT MEDIA COVERAGE



Herald-Examiner,* and the Santa Monica Evening Outlook. Two-hundred fifteen articles from January to October 1, 1976 are included in this review of the role of the local newspaper press: 31 of these were editorials and 184 were articles, some with an author's by-line and some not. Newspaper coverage by project week is shown in Exhibit 9.2.

9.1.1.1 Opening Day Coverage - Two evening newspaper headlines, "Diamond is Rough" and "SM Freeway Chaos" with photographs began opening day coverage. An afternoon edition of the Los Angeles Times was headlined, "Chaos on a Freeway." Exhibit 9.3 is a reproduction of the front pages of the three major newspapers. The first day was a confusing new experience for commuters who were confronted with left-turn restriction signs at some on-ramp entrances, long waits at on-ramps, the difference in carpool definition from two persons/vehicle at on-ramp bypass lanes to three persons/vehicle in the Diamond Lane, the presence of the CHP warning lane violators, unannounced closure of westbound Hoover and Vermont off-ramps, etc., but the day also included a malfunctioning meter, congestion from a truck turnover near the Harbor Freeway-Santa Monica Freeway interchange, the "baggy bomber" who dropped paint on the Diamond Lane symbol, and seventeen accidents.

By contrast, reports of the Freeway experience on the smoother second day of operation were noted less dramatically: "Traffic Flow Improves on 2nd Day of Freeway Test" and "Diamond Lane Greeted by Raves, Pans" (Los Angeles Times); "Freeway Conditions Improved" and "Bus Riders Laud Express Lane" (Santa Monica Evening Outlook); and "Wrecks Tarnish Diamond Lane" (Herald Examiner).

9.1.1.2 Editorials - A recent Urban Institute paper on urban transportation and the press found that editorials are "more likely to address topics which are the subject of some public concern and dissatisfaction than they are likely to reveal the sources of general public satisfaction" (Reference 1). The 33 editorials reviewed below indicate a great deal of dissatisfaction (see Exhibit 9.4, Editorial Treatment of the Diamond Lane). Negative editorials appeared in the early weeks of the project and, with the exception of three "neutral" editorials, continued with increasing fervor for the project's duration. The culprit in many cases was CALTRANS: its "faulty" philosophy and planning and its "bureaucratic isolation" from the community. Early criticism became attacks culminating in the "dishonesty" and "sin" editorials of mid-June.

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*The Herald-Examiner headlines are noteworthy since during the project, they were attention-catching 1-1/2" front-page banners which "hit the streets" in the afternoon. Examples include: "Diamond Lane Row may get Arbiter" (an exaggeration of a remark by Secretary Burns); "Cutback in Diamond Lane Hours Imminent" which appeared before Director Gianturco held her press conference; and "Diamond Lane Revolt; 20 Ticketed."

EXHIBIT 9.3

OPENING DAY HEADLINES

CLOSING N.Y. STOCKS

Los Angeles Times

MONDAY

LATE FINAL

CHAOS ON A FREEWAY

New System Jams West Side Traffic

Plot on Ford, Reagan Bared

Story in Cols. 5-6

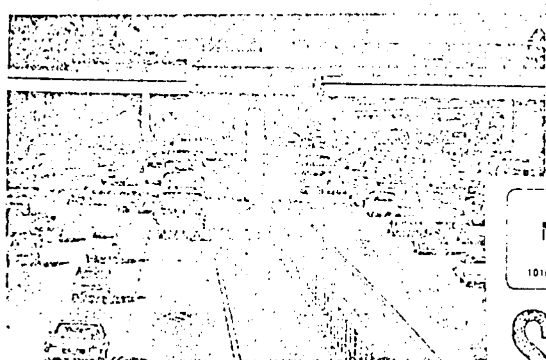
Shoe Shoos In '7000'

SEE SPORTS MAGAZINE

HERALD EXAMINER

DIAMOND IS ROUGH

New Plan Ties Up Santa Monica Fwy.



Rash of Accidents, Warnings

Nutty Task Making Rangers Squirrelly

EGYPT'S ASSEMBLY VOTES TO END RUSSIAN TREATY

Summery 79 Engulfs Southland

Plot to Kill Fc Reagan Prob

MONDAY

EVENING OUTLOOK

101st Year—65th Issue

SANTA MONICA, CALIFORNIA, MARCH 15, 1976

28 PAGES—15c

SM FREEWAY CHAOS

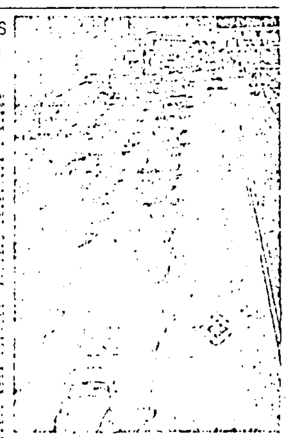
Inside Highlights

Pepperdine cagers challenge UCLA dynasty in NCAA playoffs.

SM couple prepares to have baby at home.

Two groups seek fortune in Santa Monica trash.

Rebel Units Blocked In Lebanon



Diamond Lane Spurs Jams, Accidents

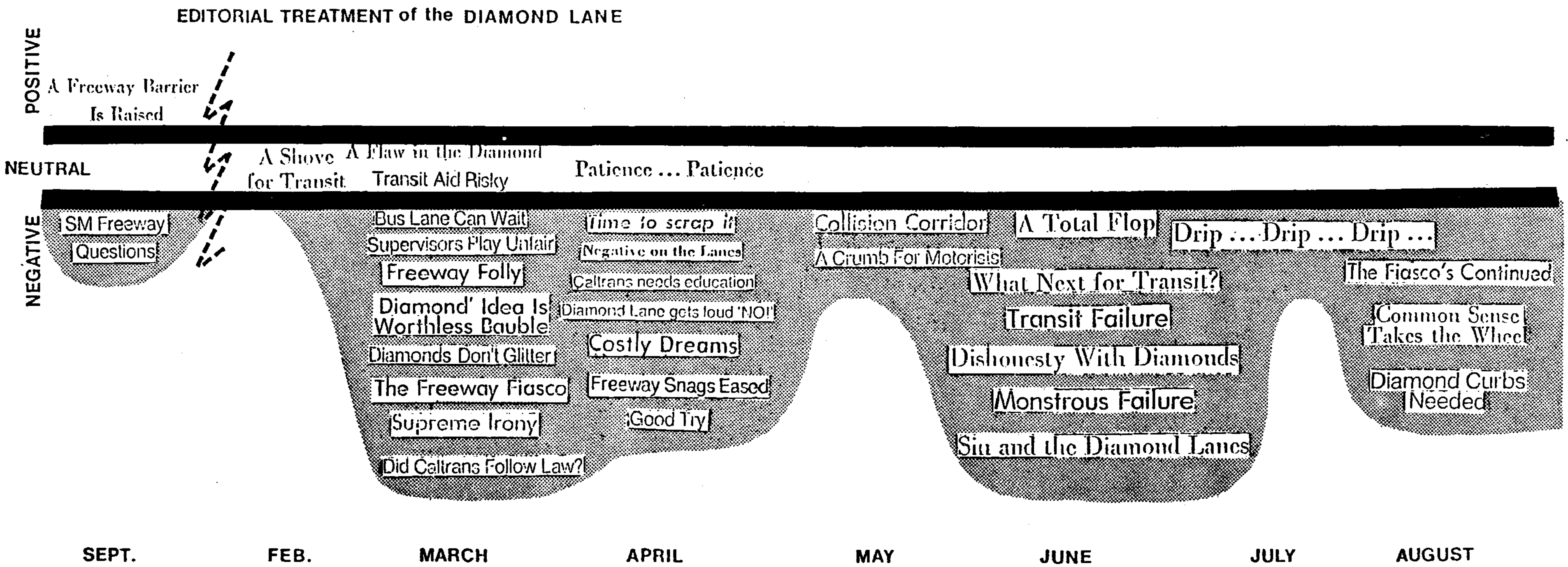
Revenue Sharing Defended

5 Percentage Points

Poll Shows Carter Favored Over Ford

Vegas Hotels Struggle To Remain Open

EXHIBIT 9.4


EDITORIAL TREATMENT of the DIAMOND LANE
POSITIVE
NEUTRAL
NEGATIVE
A Freeway Barrier Is Raised
A Shove for Transit
A Flaw in the Diamond
Transit Aid Risky
Patience ... Patience
SM Freeway Questions
Bus Lane Can Wait
Supervisors Play Unfair
Freeway Folly
Diamond' Idea Is Worthless Bauble
Diamonds Don't Glitter
The Freeway Fiasco
Supreme Irony
Did Caltrans Follow Law?
Time to scrap it
Negative on the Lanes
Caltrans needs education
Diamond Lane gets loud 'NO!'
Costly Dreams
Freeway Snags Eased
Good Try
Collision Corridor
A Crumb For Motorists
A Total Flop
What Next for Transit?
Transit Failure
Dishonesty With Diamonds
Monstrous Failure
Sin and the Diamond Lanes
Drip ... Drip ... Drip ...
The Fiasco's Continued
Common Sense Takes the Wheel
Diamond Curbs Needed
SEPT.
FEB.
MARCH
APRIL
MAY
JUNE
JULY
AUGUST

In the most positive newspaper editorial treating the Diamond Lane project, the Los Angeles Times of September 7, 1975 ("A Freeway Barrier is Raised") spoke of the Diamond Lane experiment as "one of the most promising for improving transportation in this land of endless freeways"..."It should not only speed bus service but also serve as an incentive for sharing rides in private cars." The Evening Outlook had reservations and, in their September 19 editorial, said the project was a response to an EPA "edict to take strong transportation measures to improve air quality..." rather than part of a well-planned program to improve traffic flow. They were alarmed by the predicted rise (10% to 20%) in accidents, and suggested it might not be a bad idea to try Los Angeles City Traffic Engineer Taylor's traffic flow improvement ideas before taking away a freeway lane.

The planned September project opening did not occur, and editorials did not appear again until pre-project activity in February and early March at the same time that: County Supervisor Ward was campaigning for a June ballot spot for his rapid transit proposal (nostalgically referred to as Bring Back the Big Red Cars); and the County Board of Supervisors was faced with the dilemma of a cash flow problem for the remainder of the fiscal year and, as a result, the SCRTD Diamond Lane operating subsidy from the County was in jeopardy. The Los Angeles Times editorial of February 2 on the Ward rapid transit plan questioned whether it made adequate use of the potential for bus-priority lanes on freeways. However, Evening Outlook editorials on March 2 and March 8 stated that the bus lane plan was at best a risk, and could wait until the County financial crisis was settled. When the Supervisors voted the go-ahead funds in advance of when they said they would consider the issue in public, the Outlook's conclusion was that the project had been well wired in advance behind closed doors. The Herald Examiner on March 11 editorialized that the project would be a fiasco: unsafe, unfair, and discriminatory against taxpaying single drivers. Stating that "the California motorist is an independent creature....He wants his car to take him where he wants to go, when he wants to go. This deeply entrenched habit cannot be readily changed." They failed to see how further clogging the freeway would move people faster nor how increased bumper-to-bumper traffic would save gasoline.

The first editorial to appear after March 15 was in the Herald Examiner on the second day of the project, declaring the "'Diamond' Idea is Worthless Bauble" and it cost the taxpayers $807,800. During the project's second week, each of the three major newspapers ran editorials. The Los Angeles Times editorial, "A Flaw in the Diamond," criticized the barrier at the Harbor Freeway connection but indicated that the project deserved more time. The Herald Examiner referred to the project as "The Freeway Fiasco" which had not significantly improved in two weeks and was a well-intended bureaucratic scheme. The Evening Outlook's "Diamonds Don't Glitter" said the Board of Supervisors erred in spending money for the "flop." In the third week, the Herald-Examiner said in "Supreme Irony" that the mail they received was overwhelmingly opposed to the Diamond Lanes but, ironically, instead of the project being decided on the merits of the case, a court suit filed might bring a halt to the project because bureaucrats failed to file an EIR. The Evening Outlook editorial, "Did Caltrans Follow Law?", questioned whether sections of the Motor Vehicle Code had been broken, given the increased accidents and congestion.

A pause in the negative editorial treatment of the Diamond Lanes came on April 7 in the project's fourth week, when the Los Angeles Times printed "Patience...Patience." Stating that CALTRANS had made some corrections and things were not so bad as at the start of the project, the lanes should be given the six- to eight-week trial period asked for by the Brown administration. Some of the smaller local papers called for scrapping it, saying their readers gave it a loud "No" and that CALTRANS needed to rid itself of its "public be damned" attitude.

In the sixth week of the lanes, the Herald Examiner's "Costly Dreams" editorial presented Supervisor Hahn's opinion that the park-and-ride lots were costing the taxpayers a lot of money and the project was a "flop." The Evening Outlook in "Freeway Snags Eased" wrote of City Traffic Engineer Sam Taylor's removal of the "harmful" left-turn signs onto the freeway. The editorial went on to call the lanes "elitism" for discriminating against the majority. In the next week, the Outlook, in "Good Try" said Supervisor Hahn experienced a setback in trying to have the Diamond Lane subsidy cancelled by the Board of Supervisors. The editorial called the project "bureaucratic social engineering." On May 3, the Herald Examiner in "Collision Corridor" called for a halt to the project, saying the public was overwhelmingly opposed, judging from their poll and the fact that the number of accidents had tripled. In the ninth week of the project, the shortening of the morning operating hours was viewed as a "Crumb for Motorists" in an Outlook editorial stating that CALTRANS was arrogantly insensitive to protests.

All was quiet on the editorial pages regarding the Diamond Lanes during the next few weeks before the June primary election. On June 11, the Los Angeles Times lost patience and declared the project "A Total Flop". (For text, see Appendix F.) This editorial followed the Times' Diamond Lane Review on June 1, in which they took issue with the accuracy of CALTRANS figures. Calling CALTRANS "mulishly obstinate," the Times said any increase in the people-carrying capacity of the freeway was insignificant and it was not going to change in six to eight months. The fewer cars on the freeway could be found on surface streets, and neither air pollution nor vehicle-miles traveled (VMT) had decreased. On June 16, the Times editorial "Dishonesty With Diamonds" (for text, see Appendix F) took issue with the CALTRANS' nine-week report of project success. The same figures--and the Times did not believe all of them--led the Times to view the project as a failure. The Times stated that the one-year operation is assumed by CALTRANS and UMTA despite State Secretary of Business and Transportation Burns' promise that it "would be junked in a few weeks if it weren't working." The editorial went on to say the lanes were meant to increase the use of carpools and buses; that buses had been cut back for lack of ridership, and that there had been only a "slight increase" in carpools. The _Times_ felt that CALTRANS was committed to carpooling, but that it wouldn't occur unless the lanes were in operation for the year. This idea explained the CALTRANS bureaucratic "intransigence" and this concealing of "...true intentions is a clever ploy. We think it's dishonest...intolerable in a democratic government." The same week, the _Herald Examiner_ with "Transit Failure" and "Monstrous Failure" stated that many newspapers, radio and television stations agreed that the lanes were "a flop," and the only holdouts were Director Gianturco, Secretary Burns and a few legislators. The 30% increase in traffic accidents on parallel streets* was monstrous, the editorial stated.

On June 24 in the _Los Angeles Times_ on facing pages (for text, see Appendix F) were an editorial "Sin and the Diamond Lanes" and an article by Director Gianturco entitled "Diamond Lanes: No 'Plot' Against Public." Director Gianturco's article was a point-by-point reply to the Times charges of the "dishonesty and conspiratorial motives" of CALTRANS. She first put the project in the context of the short-term transportation control plan developed in response to the Clean Air Act, proposed and adopted by the regional government in Southern California, and the more stringent EPA control plan. She stated that the entire preferential treatment program had four alternatives and two phases; all alternatives were to be evaluated and the successful ones expanded throughout the area. She concluded with three points: CALTRANS had invested only a small amount of the public's money in the project; the data had been generated and distributed in a straightforward attempt to inform the public and would be checked independently by an evaluator; and CALTRANS was not engaging in plots. The lanes had been planned for one year, she stated, and CALTRANS never expected to achieve its goals in thirteen weeks. The _Times_, in its editorial, was not persuaded and believed the premise of preferential lanes on freeways to cut air pollution and save energy was faulty, that the government should not "force people into carpools by making driving slower and more inconvenient," and without an emergency, carpools were of limited value in Los Angeles. The editorial went on to say that the reason CALTRANS and elements of the Federal transportation bureaucracy push such projects is that they "are gripped by the notion that Los Angeles' dependence on the car is excessive, and indeed rather sinful." The editorial stated the need for practical alternatives and supported air pollution control and energy conservation, but "the ideological tenacity with which CALTRANS has stuck to the Diamond Lanes in the face of the overwhelming evidence of their failure leads us to look with deepest suspicion on CALTRANS' other plans. We're afraid that if they also turned out to be naked failures, CALTRANS would still insist that the emperor had clothes." On July 22, the _Times_ called on Governor Brown, in its "Drip...Drip...Drip" editorial, to fix the constant irritant of the Diamond Lanes and stop the project.

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*This "30%" statistic, quoted in the press and by political figures, was an unfounded one originally promulgated following a June 14 press conference held by City Traffic Director Taylor (see Section 9.1.1.3).

In the final week of the project, the Evening Outlook in its editorial "Diamond Curbs Needed" stated that legislation was necessary to stop future Diamond Lanes since it appeared that CALTRANS was being run by power-grabbing social planners rather than professional highway and traffic engineers. The Times, in "Common Sense Takes the Wheel" after Judge Byrnes' decision, stated that while State officials may "have thanked the judge for clarifying laws," the bureaucrats were likely "a law unto themselves, and got caught at it." The editorial summarized the project as having demonstrated "a potential for improving transportation" through improving old systems, but "....for tens of thousands....it was (an) ill-conceived, carelessly implemented, illegal experiment."

9.1.1.3 Newspaper Articles - From March to October, the collected volume of newspaper articles about the Diamond Lane project totaled 183 and was distributed by newspaper as follows:

	Number	% of Total
Los Angeles Times	100	55
Herald Examiner	47	26
Evening Outlook	29	16
Other	7	3
Total	183	100%

The distribution over time is shown in Exhibit 9.2.

A review of the articles covering the project shows a variety of reports: the project "quakes"; polls taken by various newspapers; reviews on carpooling, bus riding, etc.; and smatterings of individual Diamond Lane experiences. Prominent among the articles were two groups of reports in the Los Angeles Times. On June 1, the Times printed a number of articles and photographs collected under the title "Diamond Lane Review -- Westside's Hottest Show." Included were: The Diamond Lanes Seem Here to Stay; Few Violators Choose to Fight Tickets in Court; Wily Ways of Those who Would Outwit the System; Ward, Hahn Protest for Free-Follower Fined $5; 60% of Riders Oppose Lanes; and Times Finds Fewer Carpools Than State. The second group of Times articles was spread over the project's duration and were written by Urban Affairs Writer Ray Hebert. Mr. Hebert had his by-line on 49 articles on the Diamond Lanes beginning in March 1976. The titles of his articles (see Exhibit 9.5) will give the reader a sense of the "quakes and tremors" which developed during the course of the project.

EXHIBIT 9.5

TITLES OF RAY HEBERT'S LOS ANGELES TIMES ARTICLES

Number	Date	Title
1	3-14-76	Controversial Experiment Freeway Car Pool,Bus Lane Will Open Monday
2	3-16-76	Freeway Experiment Jams Traffic, Angers Motorists Preferential Lane Project Off to a Rocky Start as Accidents Rise, Congestion Builds to Near Chaos
3	3-17-76	Traffic Flow Improves on 2nd Day of Freeway Test
4	3-23-76	Freeway Fiasco The Diamond Lane: Newest Caltrans Bust - an analysis
5	3-26-76	State is Prepared Official Diamond Lane Stance: Let Them Howl
6	3-27-76	Diamond Lanes May be Ended, State Official Says
7	3-30-76	Suit Seeks to Stop Diamond Lane Project Lawyer Charges Program Violates His Civil Rights
8	3-31-76	Ford Aide Urges Fair Tryout for Diamond Lanes
9	4-1-76	Surprise Start Diamond Lane Bypassed Him, Burns Says
10	4-2-76	Press Blamed for Criticism of Diamond Lanes
11	4-3-76	Coalition Asks for 'Fair Trial' for Diamond Lanes
12	4-6-76	Diamond Lane Trial to Continue 6-8 Weeks More Time Needed for Evaluation of Project, Caltrans Director Contends
13	4-9-76	City Traffic Chief Charges Caltrans Threats, Pressure
14	4-10-76	Diamond Lane Project Hit by Second Suit Program Will Cause 'Irreparable Injury," Law Firm Contends
15	4-14-76	Live With Diamond Lanes, Burns Advises Motorists Told to Stop Worrying, Give Project a Chance
16	4-16-76	Trial Ordered for Suit Over Diamond Lane Judge Refuses to Halt Freeway Experiment, Sets May 4 Court Date
17	4-19-76	2nd Attempt to Suspend Diamond Lane Plan Fails
18	4-20-76	City Eases Access to Freeway Ramps Taylor Attempts to Force Changes in Diamond Lane Plan
19	4-23-76	U.S. Backs Diamond Lanes, Official Says Board Cautioned Against Scrapping Freeway Project

Number	Date	Title
20	4-29-76	RTD Fare Boost Seen if County Subsidies are Lost Elimination of Funds in Proposed Budget Could Bring Increase of 10 to 15 Cents, Cut in Services
21	5-1-76	Diamond Lane Planners Press for 1-Year Test
22	5-6-76	LA's Traffic Chief Target of Strange Attacks
23	5-7-76	Diamond Lane's Morning Use to be Cut an Hour
24	6-1-76	Ward Warns of Need for Alternative Transportation Points Out Los Angeles Area Faces Possibility of Gas Rationing in Plea for Transit Proposal Support
25	6-1-76	Traffic Drops The Diamond Lanes Seem Here to Stay CHP Gives Tickets to 20 Drivers
26	6-3-76	20 Citations Issued Drivers' Revolt Snarls Diamond Lane Traffic
27	6-14-76	Diamond Lane Bus Operations Cut Back Lack of Patronage Forcing RTS to Trim Service 27%
28	6-15-76	Street Accident Rise Blamed on Diamond Lanes
29	6-16-76	Caltrans Chief Lauds Diamond Lanes, Indicates They Will Stay Supervisors Vote Against Requesting Halt to Project
30	6-21-76	More Diamond Lanes are on the Way for LA Caltrans Seeks Aid on Project San Diego Freeway
31	6-23-76	Mixed Views on Diamond Lanes Voiced at Hearing Caltrans Aide Warns Stakes are High and Area Would be Loser if Controversial Project Fails
32	6-29-76	RTD Raising Basic Bus Fare in County to 35¢
33	7-1-76	New Diamond Lane Plan Stirs Hostility Local Officials Express Anger at Advisory Session
34	7-2-76	Warning on Diamond Lane Jams Given 2 Years Ago
35	7-17-76	Diamond Lane Blamed for Accident Rise Expert Says Drivers are Darting Into and Out of Slower Traffic
36	7-20-76	Diamond Lanes Stir Dissension in Caltrans - an analysis
37	7-22-76	State Plans to Delay New Diamond Lanes San Diego Freeway Startup Could be Put off for a Year
38	7-30-76	Diamond Lane Protest Loses to CHP Sergeant
39	8-3-76	Caltrans Plans $1.4 Billion in Southland Work
40	8-4-76	Council Asks State to Drop Diamond Lanes Plan has Shaken Public Confidence, Officials Argue
41	8-7-76	Caltrans Error on Diamond Lane Figures Told at Trial
42	8-8-76	New Diamond Lane Project Pushed Up
43	8-10-76	End of Diamond Lanes Ordered by U.S. Judge Ruling Issued on Environmental Suit, State Given Until Friday to Halt Project

Number	Date	Title
44	8-11-76	Drivers Elated by Freedom From Diamond Lanes
45	8-13-76	Judge OKs Plan for Dismantling Diamond Lanes
46	8-14-76	Diamond Lane Goes Out Like a Lamb Quiet End Comes as Caltrans Decides Not to Seek Stay of Order
47	8-18-76	Diamond Lane Demise May Halt Other Projects Unpopular Freeway Experiment Concerns Officials of Caltrans
48	9-27-76	Diamond Lane: $3 Million and Still Counting
49	10-1-76	Caltrans Accused of Breaking Pact on Diamond Lane

In the second week of the Diamond Lane operation, Mr. Hebert wrote an analytical report entitled "The Diamond Lane: Newest Caltrans Bust" (for text, see Appendix F). Using six days operating experience as the basis of his analysis, Mr. Hebert called the lanes "ill-conceived" and "yet another traffic experiment in a long list of failures..." He said CALTRANS officials who believed the lanes were proving themselves operationally were deluded. He judged that while the lanes may have been intended to "save fuel and help reduce air pollution, they have had the opposite effect." He also foresaw that there was "little chance that Caltrans will make any modifications in the Diamond Lanes and even less that it will scuttle the project."

A second Hebert analysis (for text, see Appendix F) on July 30 focused on "an undercurrent of dissension" within Caltrans District 7 headquarters in Los Angeles over the Diamond Lane project and the concern over the "loss of credibility." He saw "no sign of change in the flow of orders" from CALTRANS Sacramento headquarters. In "the battle of numbers" which hampered "a true evaluation," Mr. Hebert pointed out the different sources of figures and reported that a local CALTRANS source said even CALTRANS numbers "are sometimes rewritten or modified in Sacramento."

Several incidents reported in the newspaper articles are worth special note, as some became recurring issues or assumptions throughout the project:

- The press' anti-project bias; and
- The problem of data and CALTRANS credibility.

At the end of March, CALTRANS issued a Diamond Lane "after" data report on the first two weeks of the project. Reporting on public acceptance, it stated that "the press adopted an 'anti-project' stance..." early in the second week of the Diamond Lane operation. On April 2, Mr. Hebert wrote an article entitled "Press Blamed for Criticism of Diamond Lanes," citing the CALTRANS report. A survey of the articles published during the early weeks clearly shows the confusion of the first weeks of operation, but there were also articles suggesting "the jury is still out on the project"; possible changes to come in the project; and reports of individual experiences on the Santa Monica Freeway. The source of the anti-project stance would seem to be the editorial pages of the Evening Outlook and the Herald Examiner, which strongly criticized the project, and the Los Angeles Times article, "Freeway Fiasco, The Diamond Lane: Newest Caltrans Bust - An Analysis."

One of the most serious controversies during the project was the data problem. The sponsoring agencies were collecting data as the project progressed, and CALTRANS became the focal point for dissemination of project figures. As "CALTRANS' project" came under attack, so did the data it issued. Other agencies began drawing different conclusions from the CALTRANS data, and some began collecting their own data.

One such incident occurred when the Los Angeles Times reported on June 1 that they had made an independent count of lane activity from the same overpass and at the same time as CALTRANS personnel. The Times team, in a two-day morning rush-hour count, found fewer carpools (428 fewer) and more violators (424) in the Diamond Lanes and brought CALTRANS methods into question.

On a number of occasions, the Times referred to mistrust of CALTRANS data in editorials. On July 22, 1976 in an editorial entitled "Drip...Drip...Drip," it was stated, "We frankly don't believe the figures that CALTRANS has been producing in support of its claim that the Diamond Lanes are working. The figures that County Road Commissioner I.L. Mohar has come up with are more in accord with our observations: a 6% drop in freeway traffic; a 9% increase in surface-street traffic."

Another data problem arose in a Ray Hebert Times article, "Street Accident Rise Blamed on Diamond Lanes"(June 15, 1976). The basis of this article was City Traffic Engineer Sam Taylor's first assessment of City street data, when he chose to publicize that injury accidents had increased 30% on east-west City streets since initiation of the Diamond Lanes. The fuller data compilations in his report contained more mixed results, but the public was left with the disturbing notion that accidents were increasing more than expected on the City streets as well as the freeway.

Two weeks later a smaller headlined article appeared (with no by-line): "Diamond Lanes Linked to Drop in Accidents." Sam Taylor had called a press conference to answer charges made by CALTRANS Director Gianturco. He also reported a different project figure assessment: a 9% decrease in all accidents and a 2.8% decrease in injury accidents. For the public reading the Diamond Lane articles, it was difficult to know from where the different figures came, why the different data interpretations, and what to believe if one wanted to put together a reasoned assessment of the project.

9.1.1.4 Cartoons - The Diamond Lane inspired a number of editorial cartoons, particularly those of Mr. Paul Conrad of the Los Angeles Times. The first two appeared in the second and third week of the project, the fourth and fifth in mid-June after the Times had published its June 1 Diamond Lane review and the editorial page had declared the project a "flop" on June 11. The cartoons speak for themselves in Exhibit 9.6.

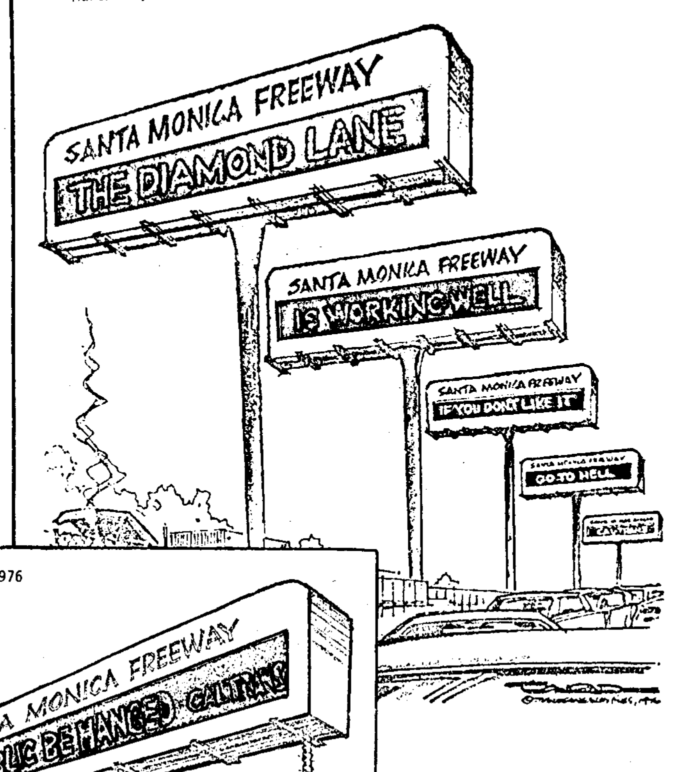
9.1.2 Other Press Coverage

This section is a sampling of articles featuring the Diamond Lane which came to the attention of the evaluation team. As the reader will discover, none suggest the Diamond Lanes had a positive image.

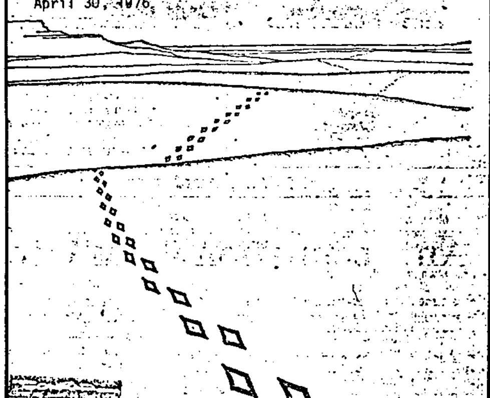
EXHIBIT 9.6 DIAMOND LANE CARTOONS

March 23, 1976

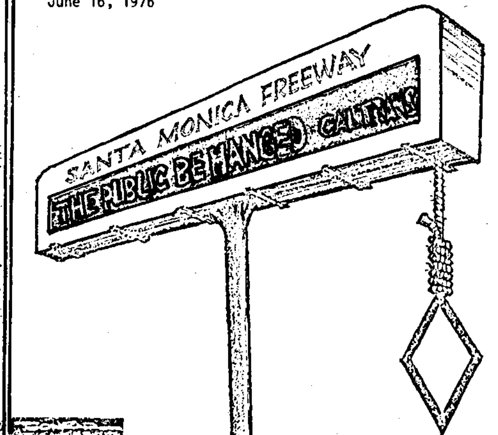
March 31, 1976



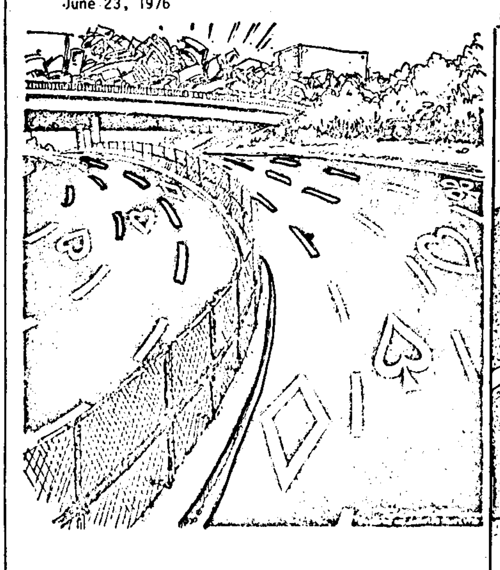
April 30, 1976



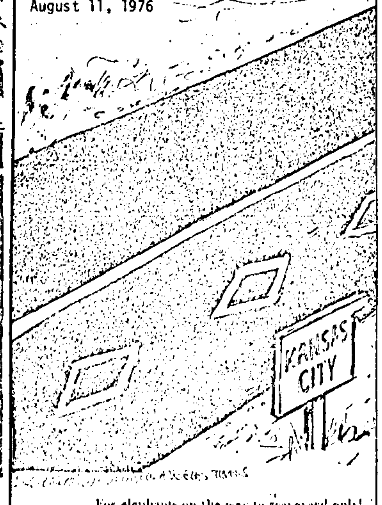
June 16, 1976



June 23, 1976

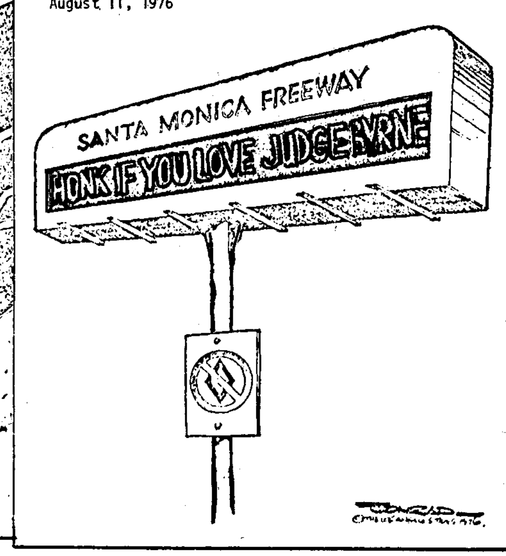


August 11, 1976



For elephants on the way to graveyard only!

August 11, 1976



The news of the confusing opening day of the Diamond Lanes was reported the next morning in the San Francisco Chronicle with the headline, "A Drivers' Revolt on Santa Monica Freeway," and gave all the "bad" news starting with "A move to force car drivers to switch..." The article included the quotes: "It was one long parking lot..." by a CALTRANS spokesman and "...this is one of the all-time dumb ideas..." by a commuter. The afternoon San Francisco Examiner with a front-page photo of the freeway entitled "L.A. tries a 'dumb' idea,'" and "A creepy feeling for commuters," a UPI article suggesting it was a confusing experiment which was "dumb" to some, "fantastic" for others, time-consuming for solo motorists and "a flop" for Supervisor Hahn.

On May 5, Roy J. Harris, Jr. of the Wall Street Journal (WSJ) wrote an article entitled "To Drive Angelenos Wild, Try Pressing Them Not to Drive." It was a project assessment of what had occurred up to that time. Mr. Harris stated two reasons for the uproar: the choice of the heavily-traveled Santa Monica Freeway for the experiment and the "...Angeleno's tendency to whiz along in solo splendor." After mentioning CALTRANS' criticism of news coverage, Mr. Harris wrote that Bill Thomas, an editor of the Los Angeles Times, said "he personally opposed the project from the beginning, fearing such programs...as cheap substitutes for rapid-transit systems," but "...never personally ordered up critical stories." A WSJ editorial on May 11 entitled "The Freeway Rebellion" suggested that while CALTRANS may be "nonplussed" by the Santa Monica Freeway revolt, they were trying to reshape lifestyles encouraged by Washington thinking via an UMTA grant, and they should be listening to and serving the needs of Los Angeles people. Another WSJ editorial (July 29), "Hitchhikers for Rent," saw the lanes as a misguided effort by government to encourage carpools to conserve gasoline. According to the WSJ, it's better to let the gas price reach "its natural level" and let people choose.

In its Environment Section, Time Magazine included an article, "Diamonds Are Forever" in the May 17 issue. The article said it appeared to State Secretary of Business and Transportation Burns that Los Angeles drivers couldn't be "coaxed out of their cars." The article labeled the project a "'disincentive' plan...aimed at frustrating...motorists into leaving their cars at home." The article stated that moves to change the project were underway, but that CALTRANS "seems determined to prove that the diamonds are forever."

In New Times Magazine, "Demystifying Jerry Brown" by Robert Scheer (May 28) put the Diamond Lane project in the context of Governor Brown's energy conservation efforts. Stating his "..actions have been much softer than his words," the example used to illustrate this point by the writer was the Governor's refusal to support the Diamond Lane plan knowing that the plan, according to Mr. Scheer, "has alienated many Los Angeles citizens who equate their cars with freedom."

In July, the California Journal noted in "California Capsules" that CALTRANS plans more diamond lanes in Los Angeles, but "Not making the same mistake twice" they will add a lane to the San Diego Freeway. The Journal described the project as "a part of an overall strategy to force Californians out of their cars and into public transportation (preferably buses)."

"Diamond Lanes Are Forever" by Dan Walters appeared in New West Magazine on July 5 and reported that, according to a "confidential 'issue paper'", the lanes were just the beginning of the Brown administration's strategy to break down Californians' dependence on automobiles, and they were one signal of a new transportation policy in an era of limits. The lanes were discussed in the context of: the development of a new State transportation plan with its land use considerations and a goal of reducing "vehicular traffic by 25% over the next 20 years;" the end of the freeway boom with attendant cutting of highway personnel and a freeze on new construction; and better use of existing freeways. According to Mr. Walters, the Diamond Lanes were "the stick...to force Californians out of their cars," and the carrot was "increased financial support for bus systems" which were "flexible and can use the existing highway system."

The August issue of Los Angeles magazine published a survey of the views of local politicians entitled "Taking a Stand on the Diamond Lane." Four men's photographs appeared with a short quote indicating they were "pro" Diamond Lane; five politicans, with quotes, who asked for more time for the lanes, were labeled "hedging" and twenty politicans stated their "con" views, most of which judged the lanes already a disaster.

The August issue of Esquire Magazine featured an article by Joan Didion, "The Diamond Lane slowdown." She described her visit to the freeway operations center at CALTRANS in Los Angeles, where a Xerox Sigma V computer minded a 42-mile freeway loop, where there seemed to be a "certain closed-circuit aspect," "a tranced distance" causing incidents to be verified, not prevented. Looking at the Diamond Lane operation, Didion's article suggested social planning removed from reality, disruption, more accidents, and a resulting "ignited and conscious proletariat." A planner told her, "All this (Diamond Lane) project requires is a certain rearrangement of people's daily planning. That's really all we want."

The air traveler on PSA in January could read in the airline's California Magazine of the "California boondoggle of 1976," which was CALTRANS Diamond Lanes. In an article, "The Last Bicentennial Review" by Tom Gable and Chris Barnett, the lanes were said to have brought "pain and misery to a couple of million Los Angeles motorists..." and the "screams of protests and sounds of crumpling fenders were so loud the program was cancelled..."

9.1.3 Radio and Television Coverage

During their 22-week life, the Diamond Lanes were a popular subject for radio and television coverage and, consequently, provided an opportunity for exposure for those seeking public platforms. Of the over 400 reports collected for media evaluation, 42% were from radio stations and 58% were from television stations. Exhibit 9.2 shows the distribution of all reports over time. Editorial and interview activity are listed in Exhibit 9.7. The most likely times to catch a Diamond Lane report were to turn on a radio in the morning hours and a television set in the evening. About 60% of the Diamond Lane reports made the morning news; 70% of the television reports appeared on the evening news.

Two common reporting styles were the chatty exchange between television news team members and between helicopter traffic reporters and local disc jockeys on the radio. These exchanges often created or picked up and perpetuated the project jargon. Examples include:

- It's the pet project of the Brown administration;
- The world's longest parking lot;
- Stubborn CALTRANS;
- It's coercion;
- "...ram it down our throats"; and
- The lanes are empty.

A sample of disc jockey talk on opening day follows:

> "Things are pretty grubby out here this morning, but don't blame the highway patrol. This was originated by the State Department of Transportation. Talk to them."
>
> "Whose idea was this -- Doodles Weaver?"
>
> "You'll get home tonight if it takes all year."
>
> "I would just like to say one thing about the Diamond... ha, ha, ha...about the Diamond Lane Express. It's a bunch of hooey. And I wanna tell one thing right now. If it keeps up the way it is, CALTRANS officials had better arrive on the scene and wrestle it to the ground.. ha, ha, ha..."
>
> "Someone wondered if it cost any money. No, it's absolutely free to drive on the Diamond Lane -- it does cost $1.00 an hour to park there, however."

EXHIBIT 9.7

RADIO-TELEVISION EDITORIAL/INTERVIEW ACTIVITY

	Editorials	Commentary	Editorial Reply	Interviews
TELEVISION				
Network Channel				
KABC 7	4	1	2	2
KNBC 4	2		1	4
KNXT 2	2		2	2
Local Channel				
KTLA 5		2		4
KHJ 9	1			5
KTTV 11				2
KCOP 13	1		1	
Total	10	3	6	19
RADIO				
KNX (freeway news)	6		5	
KPOL (soft music)		7		
KABC (talk shows)	3		1	1
KFWB (all news station)	2		1	
KBRT	1			
KFI	1			
KPFX				1
Total	13	7	7	2

"The question that could be asked is -- is this the beginning of mass rapid transit or the end of commuting on the Santa Monica Freeway?"

9.1.3.1 Peak Media Coverage - During the 22 weeks of the project, peak media coverage occurred in the opening week, the 12th, 15th, 16th, and 22nd week when the project was terminated by Judge Byrne's decision.

A sample of the remarks on the air on opening day follows:

KIIS Radio, 7:25 A.M.: "...the new bus-carpool lane throws the robot routine of rush-hour driving into a genuine uproar."

KABC Radio, 8:23 A.M.: "So a lot of bugs will have to be ironed out before this system works. This is normally a slow freeway anyway, at least eastbound into the city; but this morning, I've never seen anything like this before."

KLAC Radio, 9:00 A.M., Dave Helsel of the CHP: "...the biggest problem seems to be the on-ramp traffic; a lot of violations upon the city streets, people violating the carpool lanes and traffic backing up into the city streets."

KHJ-TV, 9:00 A.M. (The Tommy Hawkins Show), Chuck Ford, Deputy Director of CALTRANS: "...We're concerned, of course, with the continuing problem of energy conservation, we think we have capacity here in this corridor to move more people more efficiently; and we want to try to give it a fair chance...and I think for the first day we are pretty well impressed with what's happening..."

KABC-TV, 5:00 P.M.: "...But as the volume of traffic increased on the Santa Monica Freeway, so did the problems. On-ramps that had been occasional bottlenecks became virtual parking lots. Much of the time, the Diamond Lane was vacant while one and two to a car motorists crawled along in the remaining lanes..."

KNXT-TV, 6:00 P.M.: "...The controversial lane is reserved to handle just three percent of the commuter traffic. The other 97 percent--all the one and two person cars-- were creeping along."

KNXT-TV, 7:00 P.M. (CBS Evening News, Cronkite), Terry Drinkwater: "This city, the one with more cars than any other, and the one without even any plans for a mass rapid transit system, tried today to speed up auto traffic on its busiest freeway. The result was this: massive confusion, hectic, jammed-up beyond belief, a disaster, in the words of one traffic engineer. "...The experts monitored the stop-and-go and reminded reporters that it was all just an experiment. Thousands were late to work. Said one commuter, "For me, the rush hour lasted nearly all morning."

> KTTV-TV, 10:30 P.M., Burt Pines, Los Angeles City Attorney: "Over the weekend, CALTRANS has instituted a system of barriers that have seriously limited the access that people have who are on the Harbor Freeway onto the Santa Monica Freeway; where there used to (be) access at the juncture, now all the traffic is being diverted along into one lane and people are not able to enter the Santa Monica Freeway until about Normandie..."

On the second day, Harry Reasoner of ABC News commented:

> "...The Los Angeles freeway system, built by native optimists, has always been a model of its kind. No other community has ever been able to create such frustrating roads, described as obsolete the day they were opened. The general feeling has been that the best thing would be to dynamite them and advertise for new ideas. But faced with parking several million cars somewhere, Los Angeles has let them stand and tried patchwork improvements. Yesterday they began the latest experiment on the Santa Monica Freeway -- a lane reserved for cars with two or more occupants. Result? One very speedy lane with hardly anyone on it and the biggest, continuous traffic jam since World War II on the other three. The accident rate went up too. Well, back to the old drawing board."

The twelfth week of the project was heavily covered by television (71% of the coverage was television reporting), featuring a mock funeral staged by the Citizens Against the Diamond Lane group covered by television cameras set up in advance of the protest procession.

Robert Finch, former Secretary of the Department of Health, Education and Welfare and campaigning for a Senate seat, was viewed on camera denouncing the Diamond Lane project idea as "playing God." County Supervisors Hahn and Ward made a media event out of paying their $5 court fines for handing out literature (anti-Diamond Lane and pro-rapid transit bumper stickers) on a freeway on-ramp.

Events of the fifteenth week included coverage of the public hearing on the Diamond Lanes called by City Councilman Braude. Two days after the hearing, the State Energy Commission meeting was reported on, where State Transportation Director Gianturco spoke in favor of the project and the Commission announced their support of the Diamond Lane project.

In the sixteenth week, City Traffic Engineer Sam Taylor was newsworthy with a press conference on June 28 and coverage of his trial appearance. At this press conference, Mr. Taylor spoke of the decrease in accidents on surface streets (see newspaper coverage in Section 9.1.1.3), but said the Diamond Lane project was costly and that CALTRANS should "scrap it." Later in the week, the trial coverage of Mr. Taylor's testimony carried reports of his warnings about the project two years earlier. The other event of the week was the beginning of the Diamond Lane trial.

The final week of the project was filled with reports on Monday, August 9 of Judge Byrne's decision to terminate the project; on Tuesday, with the reactions of motorists to the lane's demise; and on Friday, with the question of whether CALTRANS would appeal the court ruling. A sampling of comments follows:

- "Before the Harris (SLA members) story today, the biggest story in LA was another courtroom battle"... "Judge Matt Byrne answered the prayers of thousands of rush-hour commuters...." (KABC-TV)

- "I think it is a great victory for the people;...It upholds our environmental laws..." Councilman Zev Yaroslavsky on KNXT-TV.

- "Well, we finally got rid of it" (motorist).

- "The more typical reaction is that we don't care what your statistics are. We don't feel...we are ready for preferential treatment on the freeway." (Chuck Ford, Deputy Director, CALTRANS)

9.1.3.2 Editorials

"You ain't seen nothin' yet, folks" was KABC television's warning in a late January 1976 editorial referring to the coming Diamond Lane project with its predicted increase in accidents. Of the 22 editorials monitored on radio and television and ten commentaries, only a handful could be considered as supportive or neutral about the project with "give it a chance" content in the early weeks. With the exception of two pleas in late July to "let the project run its course" and two comments in August on the sorry state of auto dependency, anti-Diamond Lane editorials were the rule. Many expressed concerns similar to those in the newspaper editorials, namely: increased accidents and congestion, increased traffic on city streets, CALTRANS credibility, and the possibly of expanding Diamond Lane treatment to other Los Angeles freeways.

Samples of editorials and commentaries follow.

On the morning of March 12 on KABC radio, the station manager said in announcing the March 15 opening, "What is not clear is how the carpoolers are expected to shoulder their way through the slow-moving packs to reach the express lane; and then to repeat the maneuver when they wish to exit. As the CHP starts pulling cheaters over to the side to ticket them, the...Freeway just might become the world's longest parking lot."

In the second project week, KNX-TV said they were concerned with the congestion, the increased accidents, and the hostility caused by the lanes. They stated that CALTRANS was thinking the lane a success, and pointing "to a significant drop in the number of cars using the Freeway," but KNX checked a little further and noted that parallel surface street traffic "has jumped by several thousand cars."

Following the news that CALTRANS said the press had adopted an anti-project stance, KPOL radio commented on April 15, "The CALTRANS report fails to mention that the news media has only been printing and broadcasting the opinions of public officials and users of the ...Freeway; the press has a duty to let people know that many of their elected officials think that the...project is a bust. Are they only to report positive comments even though thousands...on the freeway can see...little...positive?" Later in the evening, KPOL carried another commentary on the same subject of media response to the project, but with a different outlook. "Maybe CALTRANS is right. Maybe the media response...was less than objective...We all know it doesn't take much to create an artificial bandwagon effect. People looking for something to complain about will readily jump into the mainstream of a public protest if that protest gets enough publicity... The negative reaction is led by some elected officials who seem to recognize a way to win public favor when they see it. If a lot of voters are mad, then get mad with them..." The commentary concluded with "...let's give it a chance to work."

In the eleventh week of the project, George Nicholau of KNX disagreed with CALTRANS that the Diamond Lane was an acceptable alternative in response to the Clean Air Act, since it has "increased accidents"; "messed up adjacent surface streets"; "added air pollution"; "wasted more gasoline"; and "penalized people for driving small two-seater cars." "In short, the Diamond Lane is idiotic." A Coalition for Clean Air spokesman replied that KNX was doing a "vicious hatchet job" on the experiment.

In the first week of June, after the Los Angeles Times special Diamond Lane Review on June 1, editorial volume picked up with four appearing. One on KTLA evening television featured Hal Fishman, commenting that it was time for some action. Citing the Los Angeles Times counting team that found fewer carpools and more violators than CALTRANS, he stated this difference should be checked right away, since "if their conclusions are accurate, there is the inevitable implication that CALTRANS is either mistaken or deliberately misleading the public in an effort to save their failing system."

KABC radio manager said on June 3 that the results of 11 weeks of lane operation show "we have received very little for the million-dollar effort." "While the Diamond Lanes are squeezing an extra one-tenth of a person into each car, the accident rate jumped to five hundred percent of normal."

On June 7, Jim Foy of KNBC-TV who, on March 19, had advised "us guinea pigs" to wait and see, said the facts are that the lane is a "disaster." "The incentive to double or triple up in cars doesn't outweigh the disincentives to others with the aggravation, accidents, disruption, and loss of time."

Toward the end of June, the subject of expanding the Diamond Lanes to other freeways, and specifically the San Diego Freeway section where an added lane was slated for preferential treatment, elicited several editorials. KNX radio's Mr. Nicholau said CALTRANS may "think it (the lane) is the greatest thing since sliced bread" but it hasn't reduced smog or gas consumption. He stated that the head of the State Air Resources Board did not see it as a "solution to air pollution, nor does UMTA's Patricelli think it will affect energy conservation."

KABC-TV's John Severino stated, in discussing the San Diego Freeway preferential lanes, that CALTRANS "discovered the existence of the public," and are now asking advice on the proposed project. However, he stated, "Asking for public suggestions after the work is nearly finished is like asking for an endorsement on a check after it is already spent."

In early August, a KNX radio editorial said Director Gianturco "was so in love with diamonds -- diamond lanes, that is -- she is going to put them everywhere." KNXT television commented that "we live in a finite world," and "the diamond lane may be an unmistakable shadow of things to come...the early warning signs that there must be a limit to growth."

9.1.3.3 Interviews - There were 21 Diamond Lane-related interviews monitored during the project period. About half were on three local television stations: KTLA, KHJ and KTTV. Three of the interviews brought opposing views of the Diamond Lane project together for the audience: on March 27, July 23 and August 15. Critics of the lanes who appeared on several occasions were Los Angeles City Councilman Zev Yaroslavsky; Randy Kirk and Tod Snodgrass of Citizens Against the Diamond Lanes; Sam Taylor, Los Angeles City Traffic Engineer; and Mark Jones, organizer of Rent-a-Rider. Other appearances were made by various representatives of the Joint Project Board; Governor Brown also made brief comments.

The schedule of interview events is listed below:

Date		
3-15	KHJ TV	Chuck Ford, CALTRANS, Los Angeles
3-16	KTLA TV	Chuck Ford, CALTRANS, Los Angeles
3-22	KHJ TV	Sergeant Dave Helsel, California Highway Patrol
3-25	KNBC TV, KNXT TV KABC TV	Donald Burns, State Secretary of Business and Transportation Chuck O'Connell, CALTRANS, Los Angeles Dave Helsel, California Highway Patrol
3-27	KABC TV	Jim Bell, CALTRANS, Los Angeles Mark Jones, Rent-A-Rider
4-14	KTTV TV	Gary Bork, CALTRANS, Los Angeles Pat Conway, SCRTD Dave Roper, Commuter Computer

Date		
4-19	KTLA TV	Sam Taylor, Los Angeles City Traffic Engineer
4-23	KHJ TV	Councilman Zev Yaroslavsky, Los Angeles
4-26	KHJ TV	Traute Moore, Commuter Computer
5-18	KHJ TV	Randy Kirk, Citizens Against Diamond Lanes
5-28	KTLA TV	Chuck Ford, CALTRANS, Los Angeles
6-23	KNBC TV	Adriana Gianturco, Director of CALTRANS
7-2	KTLA TV	Sam Taylor, Los Angeles City Traffic Engineer
7-10	KNBC TV	Director Adriana Gianturco
7-21	KABC Radio	Director Adriana Gianturco
7-23	KPFK Radio	Chuck Ford, CALTRANS, Los Angeles Randy Kirk, Citizens Against Diamond Lanes Ted Snodgrass, Co-Chairman, Citizens Against Diamond Lanes
7-24	KNBC TV	Governor Brown
8-15	KNXT TV KTTV TV	Director Adriana Gianturco Director Adriana Gianturco Councilman Zev Yaroslavsky, Los Angeles

A sampling from the interviews listed above follows to give the reader a sense of the subject matter discussed and the views of those interviewed:

Chuck Ford on opening day:

"Well, I don't think it's the problems this morning that we're really concerned about as much as the long-term prospect of whether we can put a project like this together and make it work. We did not foresee the problems of getting the cooperation -- we've had excellent cooperation, but it took a lot of time."

Chuck Ford on the second day:

"It is congested;...We feel, however, we have enough capacity to take advantage of the total corridor capacity to operate the system, including the parallel city streets, in a better way and offer some incentive for people to get into a bus...We also want to provide some incentive, frankly, to increase the vehicle occupancy...We realize that not every person can immediately jump into a two- or three-person carpool. But we feel there is a potential that needs to be tried here."

In the second week, CHP Sergeant Helsel:

> "Yes, accidents have gone up, and we expect them to increase approximately 12 percent; and Caltrans also projected that 12 percent increase. And what has happened, you've taken one lane away from the busiest highway in the world....There has been a decrease of cars on the Santa Monica Freeway...Now the bad news is that they've gone to the city streets. The cars on the Santa Monica Freeway during the commute hours have been reduced; but, unfortunately, again, the traffic on the city streets adjacent to the freeway going parallel routes has increased six thousand cars a day... Now, if the diamond lane express thing doesn't work, then, fine, let's try something else; but I think we have to try these things before we go off and spend billions of dollars for something that even then we're not sure is going to work."

On March 25, Secretary of Business and Transporation Burns, when asked if he might make a decision on whether the Diamonds Lanes stay or go, said:

> "We've tried to stay away from a deadline, but certainly next month is the clincher, I think. If, by the end of April, it isn't working well, I think we have to undertake a reappraisal."

Asked later on KNXT-TV if the project decision was "born in the meeting of bureaucrats and impractical on the working level," Burns replied:

> "I think none of us know that yet. I think it's going to have to work out to some extent in a human context. I think it depends upon how drivers react to it; if they change their ways of driving, I think it may well work very well. If it doesn't, we'll not be reluctant to abandon it."

On April 19, Traffic Engineer Sam Taylor said the Diamond Lanes

> "...could have worked better. I hope that still they will modify it so that we serve the public better. If we had it limited to two occupants per vehicle and even use two lanes, it would be a viable project."

Two lanes would, according to Mr. Taylor, not be more difficult:

> "...Because we have about 25 percent of the traffic--the drivers who were there before the March 15 date that would be eligible. Now with the three or more, we have only about 3 percent. So what it is doing is inviting people to make long trips--the people from Malibu are very happy--and the tourists are very happy, because they can go in there if they've got three people in the car and this morning, there were about 5 percent of the cars in that lane that I observed in a couple of hours that were out of state cars."

On April 23, Councilman Yaroslavsky said he was "going to publicly support the Diamond Lane on the San Diego Freeway." "I think its important that the public understand the difference between the San Diego and the Santa Monica. On the Santa Monica, they took away a lane. And they designated the fourth lane as a diamond lane. On the San Diego, they are adding a lane. And they are going to designate the additional lane as a diamond lane." "...And in fact, yesterday, I shot off a letter to CALTRANS urging them to do what they did not do on the Santa Monica Freeway case and that is, communicate with the elected official of the district so that he can impart to them some of the problems that will develop."

On May 18, Randy Kirk was concerned about CALTRANS' current thinking on the project:

> "CALTRANS at this point does not give us really any advance reading on what their plans are with regard to the freeway. They don't -- in fact, they give us no parameters at all; they don't give us any indication of what success will be, what failure will be, when they might make changes or what kind of forces might create those changes. They're very ambiguous about the future of the diamond lane."

Later in the interview, he said:

> "...Well, this is really just an experiment; and they want to see what we people are going to do. Are we going to be moved out of our individual vehicles by, as they say, negative incentives and forced into a modal shift -- I love the words..."

In a May 28 interview, Chuck Ford was asked about any future changes in the project, and said:

> "...the most critical change that we're still considering is the possibility of a change from a three-person definition to a two-person definition of a carpool. There are a number of changes that have been made prior to this time, but that's probably the most critical one remaining.."
>
> "...if we change from a three to two definition, these are some of the problems which we would foresee. Right now we have, we feel, enough people in vehicles, two or more occupancy, that would overtax the capacity of that lane; so ... if we do that, we might very well experience on the first day a lot of people moving into that lane, and being pleased to do so, I'm sure, but possibly -- and this is very probable, we feel, that this would immediately overtax the capacity of that lane and there would be no incentive for people who are not already in a high-occupancy mode to move to that. So this would be our big concern."

On June 23, Director Gianturco replied to a question about local people feeling manipulated by people far away "who may know little about Los Angeles" trying to change things in the area:

> "I certainly understand it. I think we have to look at two things. One is the fact that this project was planned locally by local elected officials; it was not planned in Sacramento or in Washington...What began in Washington was something much more drastic than diamond lanes, and that was the EPA plan which would have involved gas rationing. And I think that's what we have to think about if we're going to talk about alternatives."

On July 2, Sam Taylor gave an opinion of the project:

> "Well, unfortunately, the diamond lane as it was structured and instituted was too much of a shock treatment ... I've tried my best for three years to get them to approach it gradually. But those who made the final decision said, no, people have got to know, have got to understand that this is something they must do. They must either form a carpool of three or more or ride a bus..."

On July 10, speaking of the proposed preferential lanes on the San Diego Freeway and hoping for less public opposition, Director Gianturco stated:

> "...But I want to make sure that we don't get that opposition. A little pre-planning, you know, is worth a lot if it turns out that a project works better as a result of it."

Later, she said:

> "...if people feel very strongly against it, I think we would seriously reconsider doing it. It is part of a plan which we have developed to meet the requirements of the Clean Air Act and I don't think that we could ignore that we have to do something. But there are a lot of different ways of skinning a cat, so to speak.

Replying to a question about the Los Angeles Times editorial, "A Total Flop," she commented:

> "...They said a lot of other things in the editorial that were just plain wrong. They said, for example, there is no hope whatsoever for increasing the number of carpools and bus riders. The week after they wrote that editorial, the number of carpools increased by 2,500 and bus riders by 500. So I don't take the statements made in the L.A. Times to represent reality as it is operating out there with the Diamond Lane."

On July 21, Director Gianturco said she backed the Diamond Lane concept and:

> "We believe that there's real merit to this kind of project. It's designed to do three kinds of things. One is to decrease air pollution, secondly conserve energy and, third, do something about the terrible congestion problems we have.

> And it's supposed to increase carpools and bus riders, and it's done that. And it's on those grounds that we think it's working; it's not that we are just out there doing something for the hell of it, essentially."

Randy Kirk on July 23 said:

> "...all we disagree with CALTRANS on is the actual mode of getting people to make that switch. And the mode that CALTRANS has promulgated has been that of dissuading people from using their cars; in other words, using disincentives of creating frustration on the part of motorists in three lanes in order to cause them to make a shift into high-occupancy vehicles."
>
> "...the general thrust of our suggestions are that you make the buses and carpooling more attractive without making the single-occupant vehicle, the driver, suffer. And I think this is where the -- maybe the big rift in our philosophy of the freeway really comes down."

Chuck Ford responded:

> "...I think my answer would be that one of our major objectives would be to make it attractive for people to move in carpools and buses -- for some valid, legitimate reasons, we believe, while at the same time not making it unbearable for the remaining traffic. Now, that is a large order. I think what we have achieved so far is quite an impressive shift compared to some of the projects throughout the country in shifts to high-occupancy; but I will admit in the same breath, almost, we do not have too many measures at this time of what constitutes absolute success or absolute failure. We do believe that there's a very legitimate need to try some of the things like we're trying here."

Both Ford and Kirk were concerned about accidents. Randy Kirk concluded:

> "...You have to balance on the one hand the good or the perceived good that you're in search of against the problems or the -- either perceived or real problems that are created by a new system...So I don't know if that's a very good balance, fifteen hundred accident victims versus two thousand people that now have made a switch."

On July 24, Governor Brown was asked if the Santa Monica Freeway Diamond Lanes should be continued, and replied:

> "It looks like they're working...in the sense that the speed at which people get to work and home is the same as before and we're transporting the same number of people in 90% of the vehicles."

Remarking that he was "keeping an eye on it," he also stated he had no intention of abandoning it.

After the project was terminated, Director Gianturco and Councilman Yaroslavsky appeared in a television debate aired on August 15. Asked about CALTRANS environmental procedures, Director Gianturco said:

> "We are disagreeing with the conclusion he (the judge) reached and the way he interpreted the evidence...presented but...it (the court decision) does throw into question the environmental procedures that we use in general and I think it indicates very clearly that we need to pay much more attention than we have in the past to make sure that every project we do not only has procedurally followed impact report requirements but substantively, we have made decisions based on considerations of the environment. And we certainly plan to do that."

Councilman Yaroslavsky said he reviewed the project and:

> "...frankly, even by CALTRANS' own statistics, which indicated there were more people being carried in less number of vehicles, that number -- those percentages were not significant enough to warrant a mass dislocation of people from their automobiles. Let me add one other thing, Larry, because I think it is important. For CALTRANS, the world ends at the freeway. For us in the City of Los Angeles, the world just begins there because we have surface streets."

Later, he said: "Why should 3,000 carpoolers inconvenience 240,000 vehicles?"

As for an environmental study of the project, he said:

> "...in my opinion, I believe that CALTRANS -- particularly CALTRANS -- intentionally avoided the environmental imapct process because the process requires a careful study of a project and its potential impact...(which) would have subjected (it) to professional criticism from other circles...(and) a public hearing; ...there were people in CALTRANS, and this was before Ms. Gianturco's time, who were determined to go ahead with this project at any cost and I think that they intentionally circumvented the public hearing process and the EIR process for that purpose."

In summary, Director Gianturco said:

> "...we face reality. We have lost this court suit. We plan to appeal...we believe that on the merits of the project, it is the kind of way to go. The people of Los Angeles have demonstrated time and time again that they do not want to spend money for mass transit in any significant amounts. There was a ballot measure which failed and quite frankly, in the absence of preferential treatment and encouraging buses and carpools, I don't know where we go."

Councilman Yaroslavsky summarized by saying:

> "The trial is over. The judge has ruled that CALTRANS engaged in a prejudicial abuse of discretion. And that's a violation of the law. They did not comply with the environmental laws of this state or this country. But just because you're the government and just because you claim that your motivations are admirable, doesn't mean you can exempt yourself from the environmental impact process. And that's the only meaning of this trial...And this suit was supported by people and the diamond lane was opposed by people who hate to see CALTRANS or any other governmental agency under the guise of environmental protection -- to shove this kind of project down our throats when the fact is that it was not...it was not helpful to the environment and indeed might have been harmful."

Gianturco: "I would challenge those findings."

Yaroslavsky: "Well, we ought to talk some more."

9.1.4 Diamond Lane Project Promotion

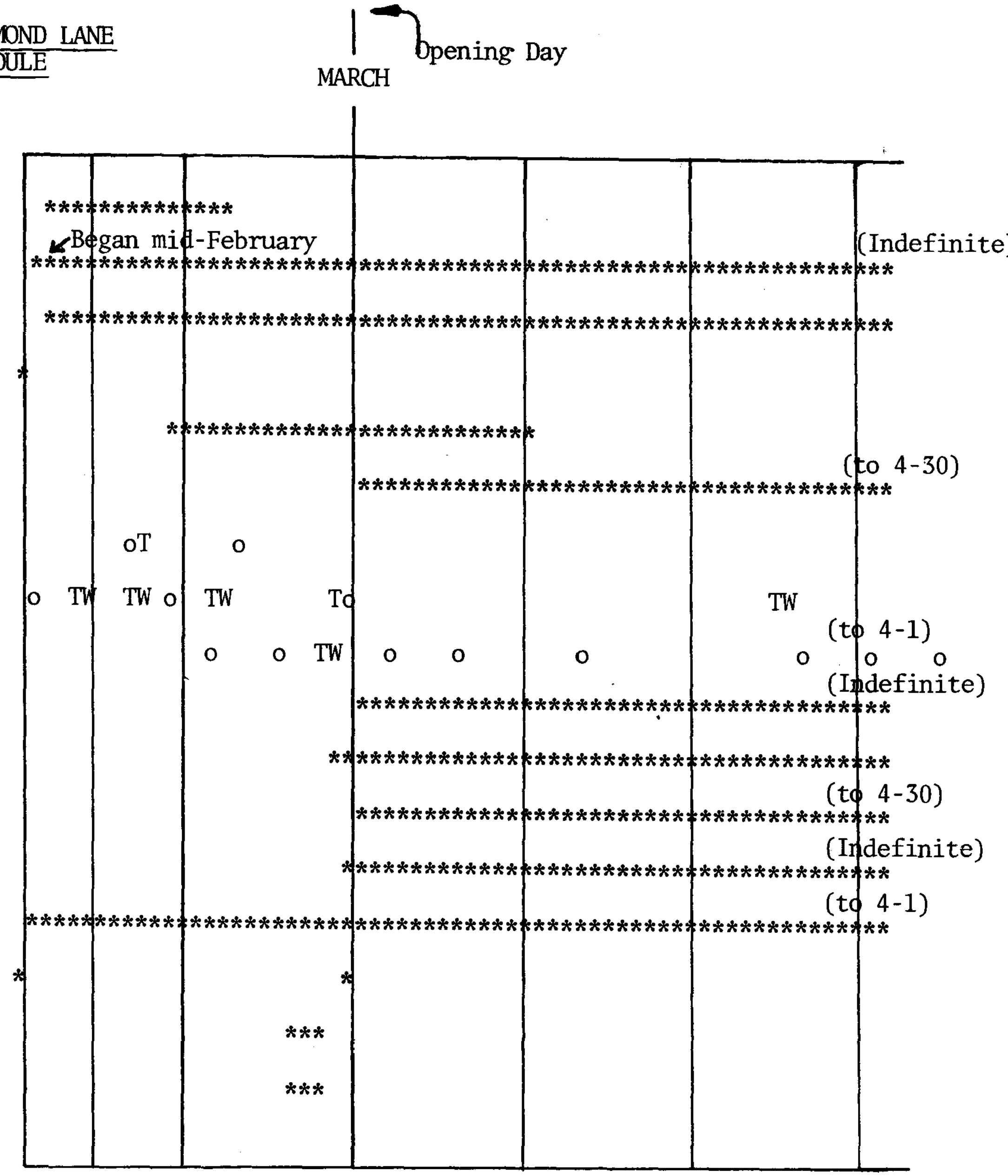
The "project will be a difficult one requiring a thorough marketing effort, particularly in the advance and beginning stages of operation when a significant adverse public reaction can be expected" (Reference 2). This statement, from the marketing plan developed for the Diamond Lane project by the agencies involved, suggests that they seemed well aware that the early days of the project probably would be hectic ones with public confusion and outcry. They were also aware of the pilot nature of the Diamond Lane operation.

The marketing objectives in the plan were to: induce public acceptance of an improved means of mass transportation which involved taking away one freeway lane for the exclusive use of buses and carpools; to enhance the chances of success of the experiment through maximum public information and education; and to increase bus patronage and carpooling by promoting new and improved services in West Los Angeles. The positive benefits of the project were to be stressed: economy, convenience, environmental improvement, energy conservation, better utilization of existing transit facilities, both bus and carpool. The choice of the name "Diamond Lane Express" was to provide a "memorable, meaningful, and promotable identity" for the project, and others like it.

The promotional program was developed by the project team as part of an UMTA grant for marketing and data collection. It appeared to be a standard advertising package for introducing a new service to the public using radio, newspaper, television advertisement, billboards, and handouts. Exhibit 9.8 lists the planned schedule of marketing events for the March 15, 1976 opening date.

EXHIBIT 9.8: <u>SANTA MONICA FREEWAY DIAMOND LANE PROJECT MARKETING SCHEDULE</u>

1. Handout CALTRANS Brochure (freeway on-ramps)
2. Freeway Changeable Message Signs (CALTRANS)
3. Information Booths (RTD)
4. Technical Press Briefing (RTD)
5. CALTRANS Radio Spots
6. Billboards (RTD)
7. CALTRANS News Advertising
8. RTD News Advertising
9. SMMBL News Advertising
10. Bus Cards (SMMBL)
11. Bus Cards (RTD)
12. Public Service Announcement
13. Community Relations (non-users)
14. Telephone Information Center
15. News Releases (CALTRANS)
16. News Releases (RTD)
17. News Releases (SMMBL)



o = Santa Monica Outlook
T = LA Times
TW = LA Times -Western Edition

The first step of the marketing effort was the announcement to commuters on the Santa Monica Freeway changeable message signs of the "Soon to Open" project. On March 1, a press conference was held and representatives from the agencies sponsoring the project described how the lanes would operate. The CHP again expressed its concern about a possible increase in accidents. The assembled press were given a package of descriptive material with fact sheets of lane, on-ramp and bus information and the first project press release. Beginning on March 3, 120,000 brochures* were handed out by CALTRANS personnel on Santa Monica Freeway on-ramps. The brochures explained the reasons for the Diamond Lanes and how to use the Lanes, including rules for drivers, alternate routes, new bus services and carpool information. For more detailed information, a tear-off postcard could be mailed in for a Rider Kit. This kit included an explanatory express bus service booklet, bus schedules, and a carpool application. All postcards were sent to a post office box number, and gathered daily to fill kit requests.** About 3,700 kits were mailed.

Newspaper advertising began in early March with ads appearing in the Santa Monica Evening Outlook and the Los Angeles Times (both the Westside and the full edition). Exhibit 9.9 is a sample ad. SCRTD operated information booths in several downtown Los Angeles locations which were stocked with Diamond Lane information, and personnel were available to answer questions.

To the project planners, this program for disseminating information to the public on the changes to take place on the Santa Monica Freeway may have looked good on paper. But with the opening day of confusion and the following weeks of mounting negative publicity and political arm-waving, it was felt that something more should be done "to recast the image" of the project, and done quickly. Where before, possible response to negative editorials or inaccurate information were considered in meetings and lists developed of what might be done to promote project understanding and support, a more assertive and quick response effort was begun in the early days of May. This effort, activated by the CALTRANS Director's office in Sacramento, was informed by a CALTRANS commissioned study by a public relations firm (John Kemp). Following Mr. Kemp's report in mid-May, CALTRANS staff "took to the streets" and to the podiums of civic group meetings, etc. to communicate in person, the project objectives and status. Some highlights of the new information program included a downtown Los Angeles marketing effort centered on individual contact and follow-up with employers; a speaker program with CALTRANS project staff appearing at various group meetings to explain the Diamond Lane project objectives and to answer questions about it; the formation of a "Friends of the Diamond Lane" group on May 20; and fast response to editorials or press coverage when it was viewed as inaccurate or

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*One of the effects of the cancellation of the September 29 project opening was to make the hand-outs, printed with that date at a cost of $10,000, obsolete. The revised version which appeared in March had been reworded and was an improved information piece.

**Samples of this literature appear in Appendix E.

EXHIBIT 9.9

Soon there will be a new way to zip downtown from the westside and home again. It's the Santa Monica Freeway Diamond Lane Express which stretches all the way from Santa Monica to the Harbor Freeway. If you're one of the thousands of westside-downtown commuters, be sure to watch for the opening of the two lanes for the exclusive use of high occupancy vehicles: buses, and car pools with three or more persons.

One lane in each direction closest to the center median will be painted with diamond-shaped symbols to designate these corridors. In addition, certain on-ramps will also have Diamond Lanes so high-occupancy vehicles can enter the freeway without delay. It will be in operation 6 A.M. to 10 A.M. and 3 P.M. to 7 P.M., Monday through Friday, to help relieve congestion, reduce pollution, reduce your commuting expense and contribute to your own personal energy conservation program.

If you want to find out more about this demonstration project, mail the coupon below. We'll send you complete information on how to use the lanes by carpool, how to join a carpool through Commuter Computer and how to travel the Diamond Lane Express by RTD or Santa Monica Municipal Bus Lines. Mail it today so you can be among the first-day commuters on this westside-downtown connection.

SANTA MONICA FREEWAY
DIAMOND LANE EXPRESS

MAIL TO:
Diamond Lane Express
P.O. Box 15014, Los Angeles, CA 90015

Please rush me complete information covering bus and carpool use of the Diamond Lane Express.

Name____________________

Address____________________

City________________ Zip________

*A demonstration project of the California Department of Transportation with participation by The Federal Urban Mass Transportation Administration, Federal Highway Administration, the California Highway Patrol, the County of Los Angeles, the Southern California Rapid Transit District, Santa Monica Municipal Bus Lines and Commuter Computer, with support from the cities of Los Angeles and Santa Monica.

misleading. For the first time, the press was notified of and began to attend Joint Project Board meetings where weekly project activities were discussed.

These activities were intended to broaden the base of support for the project and to disseminate project information to a wider community of people. As one engineer put it, CALTRANS had "taken all the flack" and, as the project moved uncertainly along, they began to see encouraging statistics which they wanted to broadcast to the general public. CALTRANS' aggressive new marketing approach was probably too late in the project to build the needed community support. The pro and con voices heard seemed to have gotten into the analysis and statistics game by developing or using numbers in different ways to show different results. It became increasingly hard to sort out what or who to believe, and CALTRANS credibility suffered after a June 1 special Diamond Lane review in the Los Angeles Times which was followed by their editorials "Dishonesty with Diamonds" and "Sin and the Diamond Lanes" (see Section 9.1.2 for details).

9.2 PUBLIC RESPONSE

On March 15, the Diamond Lane project plans became a reality for the West Los Angeles area. The Diamond Lane evoked a heated and mostly negative response on "Mad Monday," the opening day. Many people have speculated that the project never recovered. Clearly, there were problems for freeway users: accidents, both Diamond Lane-related and non-Diamond Lane-related; confusion about how to use the new roadway configuration; a malfunctioning meter at one on-ramp; the unannounced closing of two ramps; etc. As such problems accumulated, motorists reacted in a number of ways, including driving on surface streets, violating the carpool rule by using the Diamond Lane in a single-occupant car, or sitting in an idling car under congested freeway conditions; some commuters switched to carpools and buses. Overall, it may be concluded from the public response to the lanes that, while a relatively small group of people including bus riders and carpoolers were generally pleased with the project, a greater number were inconvenienced. Thus, it was perceived as benefitting too few at the expense of too many.

Measuring and assessing public response is still an imprecise art. This section describes the measures which were set up in advance and those that developed during the project. These became the indicators of how the public responded to the Diamond Lane project. The measurable results that were available are included in this section. Planned response measurements included an "early warning" telephone information center (Section 9.2.1) set up prior to project initiation, a survey of bus riders (Section 9.2.2), a survey of carpoolers (Section 9.2.3), a corridor drivers survey (Section 9.2.4), as well as monitoring of the media. A Federal Highway Administration (FHWA) survey of West Los Angeles residents was also in process and was revised to contain Diamond Lane-related questions. (These survey results are not yet available). Unplanned response indicators arose when ad hoc newspaper polls (see Section 9.2.5) were taken, a public hearing was initiated by a Los Angeles City Councilman (Section 9.2.6), a poll was commissioned by the Los Angeles Times (Section 9.2.7), and letters to the editors of newspapers (Section 9.2.8) began to flow into publication.

9.2.1 Telephone Information Center

At the instigation of the Los Angeles Mayor's Office, with $10,000 from the project contingency fund and with the cooperation of SCRTD, Commuter Computer (carpool formation service), CALTRANS and SYSTAN, a telephone center was set up at the Hollywood-Wilshire Municipal Building. This innovation developed from a concern about the perceived lack of planning for handling public response and the necessity to provide a channel for the expression of public opinion. The telephone center functioned as a lightning rod for collecting the intense outpouring of reaction to the project after its opening on March 15. Operating with a "complaints stop here" attitude, the center collected, recorded and passed on information about the commuters' reactions and problems. A direct line connected the center to the project's Operations Team and was used to clear up points of confusion, squelch rumors, and notify the team of problems being experienced by drivers. The multi-purpose center also served as the key information post for questions about service, rules, and routes, with the center number displayed on advertising, handouts, and the changeable message signs on the freeway. It was used as well by radio, television and newspaper reporters, and politicians for project updates and latest information.

The staffing of the telephone center consisted of a small pretrained core with one member of the Mayor's staff who organized and guided the center's activities, several CALTRANS engineers; a Commuter Computer employee; and a member of the SYSTAN evaluation team. The pretraining of the core group included simulated telephone inquiries, reviews of the project information kit and map details, and test runs on the Freeway, all of which were designed to acquaint the group with the reality of the project. The core group then served as trainers of the more transient staff of volunteers, personnel from Commuter Computer, and hired temporary workers.

On March 1, five telephones were operating at the center with an additional 15 installed by March 12. The center's operating hours were 7:00 A.M. to 7:00 P.M. on weekdays only. On opening day of the Diamond Lanes, the 5-6 member staff was increased to a very busy 18-20; by Thursday of the first week, the staff was reduced to about seven over the 12-hour period of telephone operation. After April 12, the center was closed and calls were referred to CALTRANS.

Each telephone center staff member had a project information kit (see contents page, Appendix D) to refer to, as well as bus schedules, Commuter Computer application forms, and project maps. Information from each telephone call received was recorded on a summary sheet (see Appendix D) which classified the calls according to their opinion of the project (positive or negative), type of information requested, caller's mode of transportation, disposition of the call, and any comments made by the caller. These summary sheets were analyzed and produced the information which follows.

Between March 1 (two weeks before the opening of the Diamond Lanes) and April 2 (three weeks after the opening), 4,092 calls were received and recorded. Exhibit 9.10 displays the number of calls received daily at the center. The number of calls on March 8 reflects the fact that the Los Angeles Times mistakenly reported the Diamond Lane opening for that day. The greatest number of calls--over 800 or nearly 20% of the five-week total--were received on opening day, March 15.

Negative calls accounted for 53% of the total calls; another 28% were requests for information only; 13% were favorable calls; and 6% represented some combination of these characteristics.

The first day of the project was chaotic, and the telephone center reflected this fact: 70% of the calls received were negative. Negative calls leveled off to around 100 per day for the next two weeks, and declined to around 20 per day for the last three days of center operation. Positive calls occurred mainly during the pre-project opening week, and represented a small percentage of the calls received after the Diamond Lanes opened. Information calls tended to be somewhat more uniform, decreasing slightly over time. About 45% of the information calls were received before the project began. Only between 10 and 30 information calls were received during the last week of the phone line's operation, suggesting that the special phone line was no longer necessary.

The type of call received varied significantly with the transportation mode of the caller. While 56% of those from single- or two-passenger cars were calling to complain about the project, only 19% of the bus riders and 36% of the 3-or-more-person car riders were. Conversely, positive expressions came from 42% of the bus riders and 35% of the high-occupancy car riders. Since about 89% of those calling drove in one- or two-passenger cars, their responses influenced the total results.

Additional information obtained from an analysis of the summary sheets is tabulated in Appendix D. Included are data on the time of day the call was received, how the caller became aware of the project, where the caller was calling from, a small sample of comments recorded, the type of information requested, and any referrals resulting from the call.

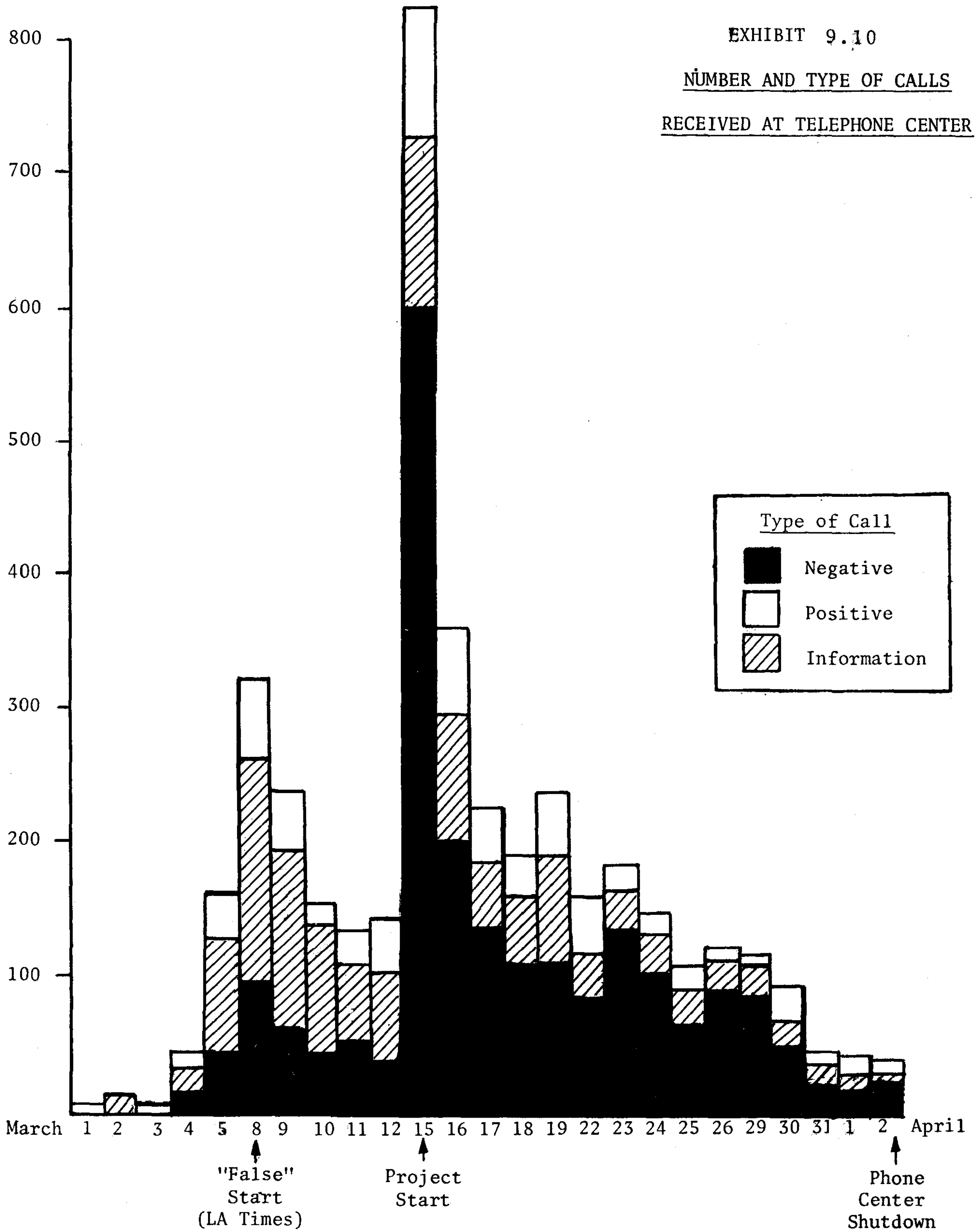
9.2.2 On-Board Bus Surveys

Another measure of public response was taken from riders of Diamond Lane bus service. Two on-board bus surveys were conducted: one on SCRTD buses on June 30; the second on August 12 of SMMBL passengers. The results of these surveys are described fully in Section 6.3 on Bus Demand.

EXHIBIT 9.10

NUMBER AND TYPE OF CALLS

RECEIVED AT TELEPHONE CENTER



Originally, the on-board bus surveys had been scheduled for later in the project when it was felt a steady level of transit ridership had been achieved. The surveys were taken earlier than anticipated because the controversy surrounding the Diamond Lanes suggested the possibility of an early project termination. In addition to project tentativeness, the bus ridership response was solicited during a time of imminent fare increases and, for SMMBL, the actual demise of the Diamond Lane as well, on the day following the survey. Tentative as the service may have seemed, 94.5% of the riders surveyed were satisfied with their bus transportation. Two Diamond Lane attitude questions revealed that 82.5% of the riders thought violations of the Diamond Lane rules were "a problem;" and 92% were in favor of the on-ramp bypass lanes.

9.2.3 Commuter Computer Survey

Commuter Computer is a non-profit corporation financed from federal, state, and local sources to promote the use of carpools, vanpools, and buspools in a five-county area of Southern California. It offers free computer matching services for carpool formation. Organized following the energy crisis in the winter of 1973, its goal is to increase the number of people in vehicles in the South Coast Basin to help alleviate the area's problems with traffic congestion, air pollution and excessive energy consumption.

Anyone wishing to form or join a carpool sends a completed form to Commuter Computer and receives a list of potential carpoolers with work patterns similar to those of the applicant. The Santa Monica Freeway, with bypass lanes at a number of on-ramps for carpools with two or more people and the Diamond Lane itself for cars carrying three or more people, was to provide the Commuter Computer service added impetus. Normally, 150-200 persons from the five-county area make application for the service in one month. Commuter Computer estimated that they received 1,864 Diamond Lane-related applications for the period from February to July 9, 1976, plus 2,000 applications from employment locations within the Santa Monica Freeway corridor for a total of 3,864.

Commuter Computer receives applications from three sources: employers (largest source), telephone calls from the public, and completed forms received from hand-out events. Telephone calls accounted accounted for 1,140 applications; handouts* for 724; and employers for 2,000 applications.

Fifty percent of the applicants were sent a potential carpool list with at least one name on it, and 33% received lists with two or more names. Commuter Computer estimated that about 10% of those receiving match-lists actually formed carpools (50% of 3,864 = 1,932; 10% of 1,932 = 193 carpools).

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*Before the Diamond Lane project began, 120,000 Commuter Computer applications were handed out on the Santa Monica Freeway on-ramps along with Diamond Lane information.

A major problem was to add more names to the data base so that more matchlist possibilities were created. At the end of April 1976, the five-county area base was 65,000* names with 92% of these from employers (e.g., McDonnell Douglas, Hughes Aircraft).

In June 1976, Commuter Computer initiated a telephone survey to evaluate its program. The sample was taken from those people who had filled out carpool applications. A special effort was made to survey the Westside commuters who had the Diamond Lane project in their travel corridor (see Appendix A for the survey form used). The final results of this survey were not available for inclusion in this report. Preliminary results showed that the primary reason for carpooling was economic: 49% in the region gave this as their primary reason for carpooling. In the westside study area, 40% of all carpoolers cited economic considerations as their primary motivation. The carpoolers surveyed preferred preferential treatment at on-ramps to the preferential freeway lane.

9.2.4 Corridor Drivers Survey

Additional insight into the public's reaction to the Diamond Lane project can be drawn from the Santa Monica Freeway Corridor User Survey. The license plate-based mail survey was conducted by CALTRANS approximately two months following project termination, after the controversy had subsided somewhat and drivers had a chance to adjust to the new travel conditions. Surveys were mailed to a broad sampling of carpools, non-carpooling freeway users, and surface street drivers (see Appendix A).

The survey respondents were asked to answer a lengthy questionnaire to aid planning and evaluating future transportation in the Los Angeles area. In several of the questions, the responding drivers were asked how they felt about the Diamond Lanes. Specifically, they were asked to rate the following programs: Santa Monica Freeway "Diamond Lanes," on-ramp bypass lanes (two or more per car), ramp metering and express bus service. The results are tabulated below with the percent of all responses below each rating on the scale:

TRANSPORTATION PROGRAM RATINGS

	Greatly Beneficial	Beneficial	Of No Benefit	Harmful
Santa Monica Freeway Diamond Lanes	4.4%	9.4%	19.1%	67.1%
On-ramp bypass lanes (two or more)	7.9	33.9	33.8	24.4
Ramp metering	16.9	45.4	21.0	16.7
Express bus service	25.0	42.6	25.6	6.9

* "Commuter Computer Finding Few Takers," Ellen Hume, Los Angeles Times, April 25, 1976.

The conclusions are fairly obvious. Although the majority of the respondents usually drove alone (84%), it is clear that their reaction to the Diamond Lane program was quite negative: 86% felt the Diamond Lanes were either harmful or of no benefit, and 58% felt the same way about on-ramp bypass lanes. Among the 330 carpoolers that responded, 68.6% rated the Diamond Lane project negatively and 39.9% rated the ramp bypass lanes negatively. The ramp metering and express bus service fared much better, receiving positive ratings from the majority of those responding.

These ratings are certainly not encouraging for the future of preferential treatment programs for high-occupancy vehicles. In fact, very few carpoolers considered the Diamond Lanes or on-ramp bypass lanes as the primary incentive to form a carpool. However, it is interesting to note that large segments of the public were opposed to the ramp metering program when it was initiated and now it is generally accepted as beneficial.

In addition to rating these programs, drivers were asked to rate three transportation problems: air pollution, future gasoline shortage, and freeway congestion:

TRANSPORTATION PROBLEM RATINGS

	Serious	Minor	No Problem
Air Pollution	78.7%	19.0%	2.3%
Future Gas Shortage	72.6%	21.9%	5.5%
Freeway Congestion	73.9%	23.0%	3.2%

Again, the message is clear. Approximately three-quarters of those responding consider each of these problems serious. However, they do not perceive the preferential treatment programs as a feasible solution to these serious problems. The consensus of the survey comments seemed to be that an effective mass transit system was needed; however, the majority of Los Angeles residents appear unwilling to support its development, as was indicated recently by a 60-40 vote against a rapid transit measure on the June election ballot. This is equally true of both people who presently carpool and those who usually drive alone.

The public reaction to Diamond Lane violators is especially revealing. The survey respondents were asked how they felt about the drivers using the reserved lane with fewer than three persons in the car. Only 21% felt that this violation of the law was serious; 44% rated it a minor problem; and 35% considered it justified or no problem at all. One or two respondents thought it was a justifiable blow against the bureaucracy. Bus riders were asked the same question during an on-board survey in June 1976, and only 17% of the bus riders thought the violation was no problem, with 33% indicating that it was serious.

It is remarkable that very few automobile drivers regarded violations as a problem despite the likelihood that such violations contributed to the high accident rate and the fact that it was simply against the law. In retrospect, this response is representative of the general public reaction to the Diamond Lane project, and indicative of the extent to which the public resisted the change.

Survey forms included an area for comments by the participants. A total of 3,478 comments were received and categorized into groups demonstrating common areas of concern. The general tenor of these comments and suggestions is summarized below; more extensive examples are found in Appendix D, Section 2.

<u>Suggestions for General Improvement of Transportation</u> (1,009 Comments: 29% of All Comments)

Over half the comments concerning improvement of transportation fell into two subcategories: comments expressing desire for more and better public transit (269 comments) and suggestions encouraging better use of present facilities and technology (290 comments). Comments in the first subcategory stressed the need for a mass transit system for Los Angeles: "When the hell are we going to have mass transit(?)," "We need a rail system equal to BART." Mentioned several times as a solution was a monorail running over or down the center of the freeway. In the second subcategory, responses suggested several areas of potential improvement, calling for more efficient fuel and engines, more and better freeways and better, more extensive bus service. Further comments noted that traffic flow in Los Angeles could be improved with one-way streets: "Designated high-volume streets need to be made one way during rush hours" and use of freeway signs to provide information on traffic conditions ahead.

Several survey participants saw the limited use of the preferential lanes unfair or inconvenient, but suggested extension of use as a solution to traffic problems. "It would have been beneficial if the Diamond Lanes could have been utilized by cars with <u>2</u> people or more." Others conditioned this suggestion to the use of preferential lanes by <u>compact</u> cars with two or more people. One person suggested that multi-wheel vehicles, such as large commercial trucks, be allowed to utilize the preferential lanes; and the complaint of unfair bias against commercial vehicles with an essentially unalterable occupancy rate was voiced several times.

To some respondents, large, slower-moving vehicles constituted a hazard when traveling in the faster lanes. "Serious consideration should be given to restricting the bus and truck travel to the #3 and #4 lanes...."

Traffic law enforcement was mentioned several times as a problem. Commenters more frequently mentioned the need for enforcement of minimum speed limit than maximum speed limit, especially in the preferential lanes. Annoyance was expressed at the number of preferential lane violators "getting away with it" both on the freeway and the on-ramps. The CHP practice of pulling violators over to the median was also condemned as drawing attention away from driving, especially in the faster lanes, and thus causing rising accident rates.

Views on metering were frequently expressed and divergent. While many comments praised the ramp metering as "very beneficial in smooth movement of traffic," others saw the metering as contributing to congestion. Comments suggested both increases and decreases in metering rates.

General Bureaucratic/Political Comments (374 Comments: 11% of All Comments)

The largest number of comments in this subcategory complained that the Diamond Lanes specifically and the idea behind the project in general were an infringement on personal rights. "I think the Dept. of Trans. is infringing on my personal rights by telling me to carpool, bus ride, or use certain lanes, etc." A frequent comment was that, as taxpayers, all citizens were contributing to the costs of the lanes, and thus should be entitled to use them. The legitimacy of CALTRANS' involvement in such a project was questioned by many: "Caltrans cannot (and should not try to) 'legislate' social change by restricting use of (the) freeway..." Many comments also protested the attitude with which CALTRANS instigated the project: "Arrogance of Caltrans in initiating the Diamond Lane probably doomed it to failure." Several responses expressed the idea that more public education was needed prior to the project, and more public input would have insured greater potential for success. "Why in the Hell was it implemented without putting it to a democratic vote (?)"

Diamond Lane Comments (1,693 Comments: 49% of All Comments)

Diamond Lane comments were subcategorized into three groups: favorable, unfavorable and conditional. Favorable comments described the preferential lane program as "a realistic step towards achievable mass transit..." and declared that the project should have received more support "at all government levels," and for a longer period of implementation.

The vast majority of Diamond Lane comments expressed negative attitudes (86%). A large number of these succinctly derided the project: "Diamond Lanes stinks," "Screw Diamond Lane not the Public," "The Diamond Lane was a disaster," etc. Several more specific problems were repeatedly mentioned. Most frequently, the Diamond Lanes were condemned as dangerous due to entrance from and exit into a relatively slow moving lane: "I never saw so much glass." Congestion resulting from the lanes proved an almost equally common complaint: "Taking away 25% of the existing lanes on (the) freeway was bound to cause serious congestion on remaining 3 lanes, you kooks!" Expressions of resentment at waste of time and increased fuel consumption from stop-and-go traffic conditions were also mentioned frequently. "Air pollution increased from idling engines as traffic stacked up." The project was perceived as an undue expense, requiring expensive advertisement and equipment and more CHP surveillance. It was also dubbed "psychologically harassing," creating "additional frustration to those using freeways leading to tempers flaring and bad driving judgment."

Conditional comments for the most part expressed the opinion that the Diamond Lane project would have been successful if it had been implemented in a different way. The comment "...A diamond lane would help people who carpool and would not hinder people who cannot if an additional lane was added instead of taking a lane away" demonstrates the general consensus among statements in this subcategory. Several of these comments included clauses of support for preferential lane projects on the San Diego and San Bernardino Freeways, where a new lane would be opened for limited use.

Personal Comments (330 Comments: 9% of All Comments)

Personal comments included a large number of responses explaining personal difficulties with using the Diamond Lane, and the Los Angeles transportation in general. Comments stating the need for having one's own car for work purposes constituted a large percent of this category. Due to nature of work, workplace, or work schedule, many people related that they personally could not arrange to carpool: "Most use car for business and have to travel alone because never know where I will be departing for." Some statements included the thought that carpooling was a good idea if possible; however, most condemned the project's purpose of promoting carpools as "unfair to people like me who found it impossible to have a carpool through no fault of mine."

Comments About Survey (72 Comments: 2% of All Comments)

Comments about the survey included suggestions for better format, complaints of studies at added expense to the taxpayer, requests for results to be forwarded to the public, and appreciative comments for soliciting an opinion from the public.

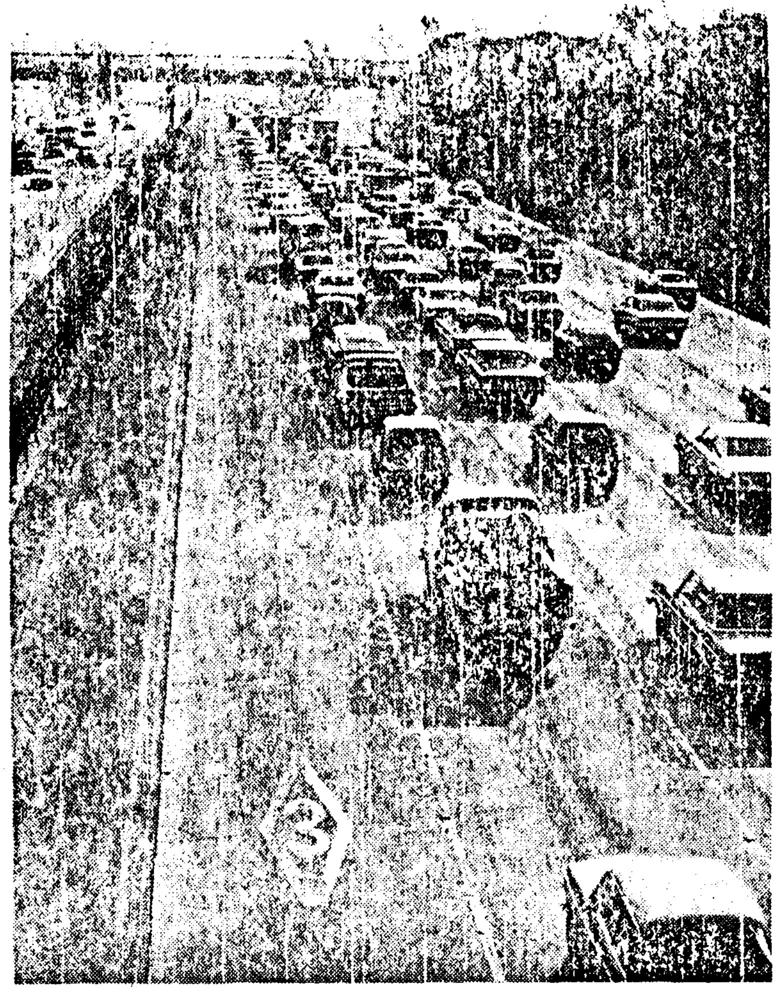
9.2.5 Ad Hoc Newspaper Polls

Three polls were created during the course of the Diamond Lane project. The first to appear was a Los Angeles Herald-Examiner ballot asking readers simply to indicate whether they were for or against the Diamond Lanes (see Exhibit 9.11). The ballot appeared on March 26, followed by an editorial report on March 31 stating that 2,000 "against" votes were received within the first 24 hours and the "will of the people (currently 75 to 1 in opposition in this newspaper's poll) and the merits of the case should themselves be sufficient to call a halt to the transit experiment."* This editorial was followed by Diamond Lane articles for several days displaying

*"Supreme Irony" editorial, Herald-Examiner, March 31, 1976.

EXHIBIT 9.11

HERALD EXAMINER DIAMOND LANE BALLOT



Santa Monica Freeway Drivers

What is your opinion of the Diamond Lane Express plan? Let us know, and your message will get to the proper authorities.

Please clip and mail to Editorial Department, Herald-Examiner, P.O. Box 2416, Terminal Annex, Los Angeles, Ca. 90051.

NAME: ______________________

ADDRESS: ______________________

CITY: ______________________

☐ I AM FOR THE DIAMOND LANE EXPRESS

☐ I AM AGAINST THE DIAMOND LANE EXPRESS

the latest vote tabulations in "Flash" boxes. On April 25, the final count was reported as: "Diamond Lane, 3,167 vote No, 57 Yes."* The coupons were reportedly presented to SCRTD's General Manager, Jack Gilstrap by County Supervisor Kenneth Hahn, a publicly-proclaimed foe of the Diamond Lanes, as in indication of the public's displeasure with this "bureaucratic fiasco."

The second opinion ballot appeared March 31 and ran for one week in the Santa Monica Evening Outlook (see Exhibit 9.12). This ballot asked if the reader was a single driver, a carpooler, or bus rider, and offered a choice of opinions about the Diamond Lane: elimination, continuation or modification. The results of the straw vote appeared in the April 6 edition of the newspaper entitled, "86% Condemn Diamond Lane, Poll Shows." The count totaled 1,787 ballots, with 1,538 opposing the Lane, 94 supporting the Lane, and 155 suggesting modifications. It was reported that the suggestion most commonly stated was to allow two-person carpools. The following statistics were presented:

	Single Drivers	Carpoolers	Bus Riders	Total
Opposed	1444 (92%)	78 (66%)	16 (19%)	1538 (87%)
For	30 (2%)	19 (16%)	45 (53%)	94 (5%)
Modify	86 (6%)	21 (18%)	24 (28%)	131 (7%)
	1560 (100%)	118 (100%)	85 (100%)	1763 (99%)

The results of a third poll, conducted between May 14-18 by Marylander Research, Inc. for the Los Angeles Times, were reported in that newspaper on June 1. In a survey of 400 people, 42% disapproved of the Diamond Lane idea, 41.5% approved, and the rest had no opinion. The Times reported** about one-fourth of those questioned had driven the Santa Monica Freeway since March 15 and 60% of them thought it a bad idea; 29.9% thought it a good idea. The Times survey found almost everyone (94%) asked had heard of the experiment. The survey also reported that about 60% of those questioned were employed and 77.2% of these drove alone to work.

The idea that Diamond Lanes might come into the nearby San Fernando Valley on the San Diego Freeway was cause for an opinion poll in the Valley News in April. The reported result was "they're agin' it."*** Further away from the fury, the Detroit Free Press

*Article of same title by Robert Knowles, Herald-Examiner, April 25, 1976.

**"60% of Riders Oppose Lanes," Los Angeles Times, June 1, 1976.

***Valley News, April 15, 1976.

EXHIBIT 9.12

EVENING OUTLOOK BALLOT

DIAMOND LANE BALLOT

I am (check one)

A single driver _____ ; Car pooler _____ ; Bus rider _____ .

I favor (check one):

1. Eliminating the preferred Diamond Lane and restoring the Santa Monica Freeway to its original condition _____ .
2. Continuing the Diamond Lane, ramp controls, etc., with no substantial changes _____ .
3. Modifications of the Diamond Lane _____ . Add written comments if you care.

Signature ________________________________

Address ________________________________

INSTRUCTIONS

Ballots should be mailed prior to April 4 to the editor of the editorial pages, Evening Outlook, 1540 3rd St., Santa Monica, Calif. 90406, P.O. Box 590. The names of everyone participating in this straw vote will be kept confidential. Readers also are welcome to submit their comments for publication in our "letters" column. All such letters must be signed.

Results will be published during the week of April 5.

asked its readers whether they would like a freeway like the one in Los Angeles with one lane marked off for cars with three or more occupants operating during rush hours to reduce traffic; the results were "yes, 54.3% and "no", 45.7%.

9.2.6 Councilman Braude's Public Hearing

On June 15, 1976, Los Angeles City Councilman Marvin Braude called a press conference to announce "the first public hearing held on the project by government at any level," which was to occur on Monday evening, June 21 at 7:30 P.M.* The Traffic and Off-Street Parking Committee, of which Mr. Braude is chairman, was to hold the hearing in the auditorium of the Department of Water and Power building in downtown Los Angeles. The announced object of the hearing was to take public testimony. From the results of the hearing, the Committee (Councilmen Braude and Farrell and Councilwoman Russell) would make a recommendation on the Diamond Lane to the full City Council. However, in addition to hearing from the public, Councilman Braude read from his June 14th letter** to the Director of CALTRANS, and called upon that agency to present a defense of the project and offer concrete reasons why it should be continued.

Approximately 250 people attended the hearing as well as newspaper reporters and a dozen television technicians. The format of the hearing was preset: CALTRANS had 15 minutes to present its report, followed by Sam Taylor of the Los Angeles City Traffic Department (LADT) with 15 minutes to report on his assessment of the project's impact on city streets. This was to be followed by two ten-minute presentations by speakers favoring the Diamond Lanes and those opposing it. Then, 30-minute segments were allotted to each side with speakers limited to three minutes, until everyone who wished to speak had been heard. These speakers had filled out "I wish to be heard" cards when they arrived at the hearing, and checked whether they would speak in support of or against the Diamond Lanes as well as supplying their name, address and organization/association. A tally by Chairman Braude indicated 46 were against the project and 24 were for it.

Carl Forbes, Deputy Director of Engineering and Operations at CALTRANS, read a long statement giving the project's background and goals. He stated that, according to UMTA, the shift to carpools was greater than on any other highway in the nation, but that the accident rate was worrisome. He asked for continuance of the project despite its inconvenience to some, since CALTRANS saw progress being made. He stated the agency would continue to adjust the project and needed time to evaluate it. The problems, he said, which brought the project about would not go away.

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*The claim that this was the first public hearing on the project is open to some dispute. Public hearings had been held regarding the regional transportation plan, which included the Diamond Lane Project, as much as one year earlier.

**Letter to Ms. Adriana Gianturco, Director, California Department of Transportation, from Marvin Braude, June 14, 1976.

The next speaker, Sam Taylor of LADT, said he had been working on the project since 1970, knew it would affect city streets, that the project had not accomplished any of its objectives, and that deterioration of service on city streets had occurred. His figures, he said, showed accidents had increased, including one fatality,* and he offered dollar costs to associate with the different types of accidents. He felt that freeways and streets should work together as a system and that the Diamond Lane project had been executed without the city's participation, specifically the metering of the on-ramps.

In summary, those speaking in favor of the project spoke of:

- Happy bus rides;
- The economy of carpooling or bus riding;
- The environmental factors favoring a change from the single-occupant car operation;
- The difficulties of producing a modal shift due to the project's tentativeness;
- Rapid transit being voted down for a third time with nothing else in the offing to help transit problems; and
- Someone finally taking action to reduce the number of cars and offer alternatives.

Those opposed to the project spoke of:

- Discrimination because fuel-saving two-seater cars and motorcycles were ineligible for Diamond Lane use;
- The lack of public input to the planning of the project;

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*The fatality described by Mr. Taylor as being Diamond Lane-related involved a woman allegedly accustomed to driving on the Santa Monica Freeway who reportedly was avoiding it due to congestion and, on an unfamiliar surface street, failed to see an intersection light. She was involved in a two-car collision and died about one month later.

- The reported increase in accidents;
- Social engineering and experimentation on people;
- CALTRANS doing business in secrecy and invalid or "strange" CALTRANS data;
- Impossibilities of using other than single-occupant car for salesmen, etc.;
- Lack of an Environmental Impact Report (EIR) and competent engineering study; and
- Lack of incentives and the presence of coercion.

Southern California Automobile Club Director John McDonald spoke of the unsafe aspects of the Diamond Lane, and suggested instead more preferential on-ramp metering while supporting high-occupany vehicle (HOV) programs in general. He said he was aware of the Clean Air Act implications, but that it was being amended. An economics professor from USC, Pete Gordon, presented a rough cost-benefit study indicating a net loss of $6.5 million per year from the project due to delays, accidents, etc.

The reports on the hearing were headlined in the Herald Examiner as follows:

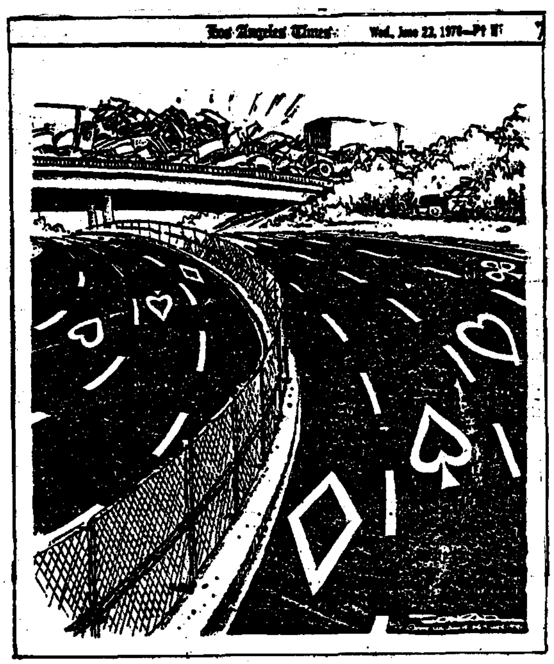
'Diamond' Hearing: 2-1 Against

and in the Los Angeles Times as:

Mixed Views on Diamond Lanes Voiced at Hearing

Caltrans Aide Warns Stakes Are High and Area Would Be Loser if Controversial Project Fails

The hearing also inspired the following Conrad cartoon on Wednesday morning, at least partially based on a man's request at the hearing that in the interest of completeness a club be painted on the lanes but not a heart.



9.2.7 Corey Research Poll

Between August 13 and August 18, after the termination of the Diamond Lane project, the Los Angeles Times commissioned Corey Research to conduct an attitude survey (Reference 3) of the project. This was not a separate Diamond Lane survey; rather, eight questions on the Diamond Lane were added to an on-going countywide study and a Malibu study. Over 1,200 Los Angeles County residents were asked how frequently they used the Santa Monica Freeway, and 494 (39%) said they were regular or frequent users. This group was then interviewed in person. The sample of 494 users was made up of 287 (58%) Malibu residents. Malibu, a community of about 15,000 people, is located approximately 12 miles from the eastern end of the Santa Monica Freeway, outside of the Westside project area of 616,000 people. The survey document states, "By omitting the Malibu breakdown only, the sample becomes representative of Los Angeles County." The remaining sample figure was 207 people.

The Times reported on September 5 that "more than two-thirds of the motorists using the Santa Monica Freeway while the Diamond Lanes were operating found it necessary at one time or another to avoid the Santa Monica Freeway and use other freeways or surface streets instead....."* The survey results reported in the Times were largely negative on the Diamond Lane project. Of those responding, 73.3% thought the experiment was a poor way to achieve the objectives of conserving energy, reducing congestion and air pollution by reserving the fast lane of the freeway for carpools and buses, and 84.8% said, if asked to vote on the issue, they would not choose to renew the project.

Sixty-nine percent reported that it took longer to reach their destinations driving during Diamond Lane hours: 28.2% said up to ten minutes longer, 44.9% up to 20 minutes longer, and 18.5 up to 30 minutes longer. Asked if they ever avoided the Santa Monica Freeway by using surface streets or other freeways, 58.1% said they used surface streets, 13.2 said they used another freeway, and 36.5% said they never avoided the Santa Monica Freeway. By using the word "ever" it is not known whether this was a frequent occurrence or a one-time event. From the results of the CALTRANS corridor driver survey, the number of drivers who experimented with surface streets before returning to the freeway was approximately equal to the number who transferred to surface streets throughout the demonstration.

In addition to the results published in the Los Angeles Times, those surveyed were asked:

Did you or anyone in your family use the "Diamond Lanes?"

Yes, carpool	22.9%
Yes, bus	1.6%
No	74.5%

Do you believe the Santa Monica Diamond Lane increased or decreased congestion?

-on the Freeway		-on Adjacent Surface Streets	
Yes	87.4%	Yes	75.7%
No	7.1%	No	7.7%
Don't know	5.5%	Don't know	16.8%

*Los Angeles Times, September 5, 1976.

When asked who was responsible for the project, 56.9% believed it was CALTRANS and another 31.4% believed it was the CALTRANS Director, Adriana Gianturco, who took office the day the project opened. Other answers included:

Governor Brown	7.9%
Federal Highway Administration	6.7%
California Legislature	6.5%
Donald Burns, Secretary, Business and Transportation Agency	5.3%
Clean Air Act	4.7%
Other	3.6%

The summary table from the Corey Research survey document is Appendix A.

9.2.8 Letters to the Editor

One-hundred twenty letters sent to the editors of Los Angeles area newspapers after the opening of the Diamond Lanes were reviewed. (A few letters appeared prior to the Lane opening decrying the upcoming project.) The negative letters represented 68% (82) of the total, with 29% (34) positive and 3% (4) neutral letters. A breakdown by three major papers, the Los Angeles Times, Herald-Examiner, and Santa Monica Evening Outlook, follows:

	Negative		Positive		Neutral		Total	
	No.	%	No.	%	No.	%	No.	%
Los Angeles Times	43	57	29	38	4	5%	76	100
Herald-Examiner	19	100	--	--	--	--	19	100
Evening Outlook	20	80	5	20	--	--	25	100
Total	82	68%	34	29%	4	3%	120	100%

Over time, 50% of the letters were published during the third and fourth weeks of the project. Another 20% appeared during the month of August when the Los Angeles City Council voted to ask for a halt to the project; Judge Byrne ruled that an EIR must be filed; and later that week, the Diamond Lanes were terminated.

Most of the positive letters spoke of the time and money saved by carpooling or bus riding and, early in the project, of the need to give the project time to prove itself. Two long pleas appeared on August 2 from Stan Hart, an engineer and Sierra Club activist, and Robert Donovan, an associate editor of the Los Angeles Times. "An Expert Pleads: Hang In There, CALTRANS," by Mr. Hart, spoke to the need for a fair trial period given local air pollution, congestion and overconsumption of fuel. "Shine On, Diamond Lane, Shine On," by Mr. Donovan, addressed the federal funding situation, where the competition for funds is heavy and the Federal Department of Transportation is searching for cities willing to experiment to better use existing facilities and who then plan and seek aid for incremental growth of their overall transportation systems as needed.

The negative letters expressed a great variety of complaints, and some strong words (suggesting that the responsible officials be fired, bemoaning the "social engineering" aspects of the project, and blasting the public-be-damned attitudes of the bureaucrats), but often-repeated comments included:

- This project has been forced on us; coercion has been used; it is a loss of freedom of movement;
- We paid for it by our gas tax money;
- They've taken away one-quarter of the freeway; taken <u>away</u> a lane;
- We can't use the lane because of irregular work schedules or the type of car driven (two-seater, motorcycle, sportscar);
- It's dangerous;
- Bureaucrats planned it;
- Travel time has been increased;
- It benefits a few and penalizes the majority; and
- Concern with smog and congestion caused by idling, bumper-to-bumper traffic and wasted energy.

The end of the project by a court ruling evoked the following quotes from letters to the <u>Los Angeles Times</u>:

- "...a sad defeat...";
- "...ah, sweet victory....";
- "...would like a lawsuit by taxpayers who resent the use of their gasoline taxes for the convenience of Westside commuters who insist on using the freeway during peak rush hours one-to-the-car."
- "public has triumphed over the bureaucracy."
- "Rather than carpool on the Santa Monica Freeway, the 'money' people of Beverly Hills, Brentwood and surrounding areas, got their way!"
- "Judge Byrne...ruled on its merits. The true hero to ultimately win it (the legal suit) to the benefit of all the people. That man is Councilman Zev Yaroslavsky..."

- "...Again we see a blow against the welfare of the people. The fat cats are in control."
- "...While the majority of Los Angeles seems to rejoice over the demise of the Diamond Lanes, those of us who were willing to try them but who now face higher gas bills and longer commutes are not happy..."
- "It is ironic to see the court turn an instrument of public protection against the public interest (as distinguished from popular sentiment)..."
- "...consider amnesty for past Diamond Lane violators...."

9.3 LEGAL ISSUES

Some of the Diamond Lane dissension took place in the courts. Two lawsuits were filed; one came to trial and resulted in the termination of the project for lack of compliance with Federal and State environmental laws. Several bills were introduced in the legislature to influence the project's direction or cause its termination, and a share of the public cited for lane violations took their cases to court.

9.3.1 Legal Basis for Diamond Lane Project

With the opening of the Diamond Lanes on the Santa Monica Freeway, callers to the telephone information center asked what the legal basis was for preferential lanes and were told the legal authority derived from Section 149 of the Streets and Highways Code, also known as the Carrell Act of 1970, and from the Warren Act (AB918). The Warren Act required CALTRANS "to develop programs and undertake construction to establish preferential lanes" on major metropolitan area freeways and encouraged preferential lanes for buses and three-passenger carpool vehicles on the Santa Monica Freeway as a pilot project.

Early problems with these pieces of State legislation included an editorial entitled, "Did Caltrans Follow Law?" in the Evening Outlook on March 31, 1976. This editorial questioned the use of Section 21655.5 of the Motor Vehicle Code as a basis for ticketing Diamond Lane violators, since the purpose of the preferential lanes was to reduce--not increase--congestion on highways. It also suggested the intent of the law was that the preferential lanes would not have an adverse effect on safety, and cited the safety study made by CALTRANS prior to the project opening which predicted a 10-12% increase in accidents. No response to these questions was noted in the press. A second problem concerned the definition of a carpool as a vehicle with three or more occupants. Although there was talk of changing this definition to two or more occupants, such a change required legislative action. The CALTRANS District 7 legal staff stated it was their opinion that "under the California Public Resources Code, the number of people in a carpool on the Diamond Lane cannot be changed from three to two. It is also clear that to be consistent with the State of California Implementation Plan for Achieving and Maintaining the National Ambient Air Quality Standards, that a carpool be defined as three or more."*

The carpool definition issue was hotly debated. On one side of the argument were those who had purchased fuel-saving small cars, sportscars with only two seats, and those who felt the Lanes were "empty" versus the CALTRANS figures pointing out that if the carpool definition were changed, the lanes would be full and the incentive to use them lost. Reports in the press and at Joint Project Board meetings that the carpool definition was under study and might be changed kept the issue alive throughout the project.

Potential legal action simmered in the background during the project. On March 30, City Councilman Yaroslavsky requested the Los Angeles City Attorney to investigate whether an Environmental Impact Report (EIR) should have been completed in connection with the Diamond Lane implementation. This item was suspended until the matter was resolved in court. Later, when the issue of preferential lanes on a portion of the San Diego Freeway arose in July, the Council voted 7 to 1 to order the City Attorney to file suit in the U.S. District Court if he found an EIR necessary for the project.

On April 9, Councilman Yaroslavsky and Councilwoman Stevenson requested the City Attorney to report to the Council on any liabilities which the City could incur by not making necessary corrections and/or adjustments to provide for the safe flow of traffic on City streets. The reason for this request was the Traffic Department report that the Diamond Lane experiment had greatly increased the traffic volume on surface streets and the allegation that CALTRANS had pressured the Traffic Department not to make changes on the surface streets to accommodate the increased volume. On June 7, the City Attorney concluded: "...it is our view that if it is the opinion of qualified and professional traffic experts that a dangerous condition of public property is created on a City street as a result of the Diamond Lane Project, the City should undertake reasonable corrective action or it could face significant liability exposure. The extent of such exposure would depend upon the facts and circumstances in each case."**

9.3.2 Eric Julber Lawsuit

The better-publicized legal issues came from the two lawsuits. The first was a civil suit filed on March 29 by Eric Julber, a regular Santa Monica Freeway driver and an attorney. This suit

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*CALTRANS memorandum on carpools.

**Letter from T.C. Hokinson, Assistant City Attorney, to the Chairman of the Traffic and Off-Street Parking Committee, Los Angeles City Council dated June 7, 1976.

charged that CALTRANS had failed to file an environmental impact report and was therefore in violation of the California Environmental Quality Act of 1970 (CEQA); therefore, his constitutional rights had been violated under the 5th, 9th and 14th Amendments to the U.S. Constitution. Mr. Julber sought an injunction against CALTRANS in Judge Norman Dowd's Superior Court. KABC-TV quoted Mr. Julber on March 30 as saying: "What I object to mostly is, it's very coercive on the part of the government to tell people, 'you must change your lifestyles and you must adopt what we think is good for you, and we will reward you if you do, and we will punish you if you don't.' There's a tremendous threat to individual liberty in that sort of thing." Quoted in the Los Angeles Times,* he charged that the result of CALTRANS actions was to:

> "slow traffic, increase fuel consumption, create air pollution, (and) increase sharply the number of vehicular accidents...." (and) "harass, injure the health and fray the nerves of human beings using said roadway...."

In addition, Julber argued that his constitutional rights were violated in that his right to private property (his car) was being taken for public use (sharing a carpool) without just compensation.

At a hearing on April 16, Judge Dowds refused to issue an injunction to stop the project. Mr. Julber had argued that:

- CALTRANS did not file a negative declaration nor an an environmental impact report as required under CEQA;
- CALTRANS' claim of a functional equivalent of a negative declaration was not filed with the Resources Secretary as required;
- The project was not a minor alteration of an existing highway, since it substantially affected the environment; in addition, if the project could cause or was a subject of controversy, it did not fit the exempt category. An environmental impact report is required if the project has a significant effect, even if under categorical exemption; and
- The statute of limitations for bringing suit had not run out as claimed by defendents, since no formal approval of the project had been made and, if a project is undertaken without formal decision by a public agency, a suit may be filed within 180 days.

Judge Dowds questioned the existence of substantial evidence to show that the project was categorically exempt, the validity of requiring an EIR if the project was categorically exempt, and if the exemptions were valid or not. CALTRANS argued that:

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*"Suit Seeks to Stop Diamond Lane Project," Ray Hebert, Los Angeles Times, March 30, 1976.

- The Santa Monica Freeway project was a pilot program -- a data collection project to test feasibility;
- There was no evidence that substantial harm has occurred and the operation was improving as it proceeded; and
- An EIR may be filed while the project was going on; they asked that the project continue to operate, since it was a viable substitute for Federal controls which would greatly affect the community.

Judge Dowds denied a preliminary injunction, but said a trial was needed since there were questions that needed to be explored and answered. While the project might be a minor alteration, the question of whether CALTRANS should have filed an EIR remained unanswered. The trial never came about, since a second suit was filed on April 9, 1976 in the U.S. District Court on the grounds that both CEQA and the National Environmental Policy Act (NEPA) rules had been ignored. It was felt that the Julber case trial was unnecessary due to similarities between the two cases. The evening news report on KHJ-TV said that:

> "....CALTRANS has been saying that people will get used to the project. Attorney Julber said, 'People can get used to anything, even an amputated arm, but that doesn't give the State the right to amputate an arm.'" The commentator went on to comment, "He's got something there...."*

9.3.3 Pacific Legal Foundation-Yaroslavsky Lawsuit

The second lawsuit was filed by the Pacific Legal Foundation (PLF) a Sacramento-based public interest law firm. The suit stated that "the public would suffer substantial and irreparable injury unless the project is terminated immediately." PLF claimed the project caused:

- Increased energy consumption;
- Increased ambient noise levels on surface streets;
- Alteration of level, composition, and distribution of air pollution; and
- Increased accidents.

The defendents named were: Donald Burns, Secretary of the State Business and Transportation Agency; Adriana Gianturco, Director of the State Department of Transportation (CALTRANS); and Robert Patricelli, Administrator of the Federal Urban Mass Transportation Administration (UMTA).**

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*KHJ-TV, Channel 9, 10:17 P.M., April 16, 1976.

**SCRTD was added to the list of defendents before the trial opened.

On April 15, a hearing was held on PLF's request for a preliminary injunction against the project. During the hearing, PLF argued that:

- The project was an "experiment" to create a modal shift which was social and philosophical in nature rather than a technical engineering project;
- Their aim was not to halt the project, but to have the CEQA and NEPA laws followed and an EIR filed;
- They could show the existence of controversy (they cited the Coleman vs. City of Davis case where the fact that a project could create disruption was considered) and control of operation by UMTA; and
- The negative declaration was incorrect in stating the project had no adverse effect.

The lawyers representing UMTA argued that:

- The project was for study and evaluation, and primarily a marketing and information gathering effort;
- The negative declaration existed and was an interoffice memorandum (and therefore no EIR was necessary), which did not need to be filed outside the U.S. Department of Transportation and which was available to the public upon request (PLF requested and received a copy of the memo);
- PLF was without standing; the Sacramento firm was not the actual injured party;
- To be granted a preliminary injunction, the party must show irreparable and permanent harm, and the project was improving;
- UMTA properly followed its own procedures; the lengthy grant application was studied and assessed by UMTA; and
- When asked by Judge Byrne to clarify the issue of an experimental versus a permanent project and the question of an EIR, the lawyer for UMTA replied that they were not going to contend that for an experimental project, no EIR was needed but that what UMTA funded was a study of the impact (marketing, information, etc.), and that a discontinuance of this funding would not discontinue the project operation, just the assessment of the project.

In brief remarks, CALTRANS lawyers mentioned several factors for consideration: the existence of a functionally equivalent document (the 1975 Transportation Control Plan for air quality in the region) to an EIR under CEQA; the project was a joint cooperative effort to use the existing transportation investment more efficiently; and there were signs that the PLF case had only a remote chance to succeed on its merit.

Judge Matthew Byrne, after questioning many points made by both sides throughout the hearing, stated:

- At this point, "I find you (PLF) to have standing";

- Both sides argued too broadly. "There are two issues: Should there have been an EIR under CEQA and, secondly, under NEPA;"

- For what reasons did UMTA conclude that an EIR was unnecessary? ("...all you have is a conclusion." Did DOT have a file showing a study to back up the negative declaration and did CALTRANS have a file showing a similar study?)

- In conclusion, Judge Burne noted that there are serious legal and factual issues raised which should be resolved in a trial. Contradictory affidavits have been submitted, and the issues raised by both sides are not clear. In the interim, no preliminary injunction would be issued, and the project's status quo would be maintained.

A trial date was set for May 4. On April 27, a motion to dismiss the suit was denied, and Judge Byrne delayed the trial for two weeks. He asked the plaintiffs to clarify "whether they seek abandonment of the experiment or halting of money for its maintenance to guarantee the removal of the special lane."* SCRTD, a major sponsor of the Diamond Lane project, was added to the list of defendants. On April 30, fearing that the trial would adversely affect a 283-mile rapid transit proposal, SCRTD asked that the trial date be set after the June 8 election. Judge Byrne, who had previously said a trial should be held at the earliest possible date, stated he would not be influenced by the election date.

Prior to the trial, Councilman Zev Yaroslavsky had added himself as a plantiff along with PLF. It was later ruled that the PLF had no standing, and thus Councilman Yaroslavsky became the injured party.

Opening arguments were heard on June 30 and final arguments on Friday, August 6. Appearing as witnesses during the trial were:

Date of Appearance	Name	Association
6-30	John Kilroy	Trustee of PLF
6-30, 7-1	Zev Yaroslavsky	Los Angeles City Councilman
7-1, 7-16	Sam Taylor	Los Angeles City Traffic Engineer
7-6	Robert Lunche	Former Air Pollution Control Officer, Los Angeles County Air Pollution Control District
7-7	Donald Dove	Former Chief, Environmental Planning, CALTRANS

*"Diamond Lane Suit Skips Roadblock," Herald-Examiner, April 28, 1976.

Date of Appearance	Name	Association
7-8	Charles Ford	Deputy Director, CALTRANS, District 7 (Los Angeles) and Project Manager
7-9	Robert McManus	Associate Administrator and Special Counsel, UMTA, Washington, D.C.
7-13	Charles Boyer	CALTRANS District 7
7-14, 7-16	Gary Bork	Freeway Operations, CALTRANS District 7
7-16	John Burris	Chief, Environmental Investigations, CALTRANS, District 7
7-15, 7-16	Paul O'Shea	Expert witness on accidents (business: automotive research)

The plaintiff's opening arguments were that:

- Travel times were now longer;
- There were more accidents;
- There was an adverse effect on City streets;
- The City Traffic Engineer had been encouraged not to adjust anything on the streets so that a modal shift would occur;
- The public would not accept a modal shift;
- NEPA and CEQA called for public hearing and interaction and there had been none;
- The project added to the photochemical pollution;
- The project was not an action under the Clean Air Act (CAA); and
- The remedy for the adverse effects was to stop the project.

The defense stated that:

- The project was an action to further the CAA and therefore exempt;
- There were two projects in existence: UMTA's data collection project and the local agency operation;
- PLF was not an "affected party."

Highlights of witnesses' testimony are included in Appendix G.

Final Arguments

After hearing final arguments on Friday, August 6 from the opposing sides, Judge Byrne ruled that an environmental impact report must be filed under both national and state environmental laws. The freeway was to be returned to pre-project status by Friday, August 13. CALTRANS was given 180 days from that date to file the required EIR. No funds were to be expended except to evaluate data then available, to conduct attitudinal surveys, and to reimburse project participants for funds expended up to August 13. CALTRANS could continue to operate ramp meters and preferential bypass lanes on the ramps which were in operation before March 15, 1976.

The finding of fact and conclusions of law, filed September 10, 1976, give the detailed evidence for the conclusions reached. Highlights of the findings and conclusions are given below:

Standing

- PLF had no standing, being neither a broad-based membership organization with a special interest in the environment nor having geographical nexus to the Santa Monica Freeway.
- Councilman Yaroslavsky had standing, as he suffered injury and had geographical nexus.

Statute of Limitations

- The statute of limitations under CEQA had not run out, since it was unclear when the project was approved and it was undertaken without a formal decision by the public agency.

CEQA Non-Compliance

- The project came under CEQA rules, because there was no certainty the project was not going to cause significant harm.
- Traffic congestion, safety and health are environmental factors to be considered.
- The project was not categorically exempt under CEQA nor CALTRANS CEQA guidelines (Dove's testimony); and there had been warnings of congestion and surface street problems (Taylor testimony).
- The project was not a mere modification of a traffic control system; there was not substantial evidence to support the categorical exemption or the negative declaration.
- Mr. Dove's "Environmental Study" of April 1974 was a verbatim copy of the proposed "Negative Declaration" submitted earlier to him by CALTRANS Freeway Operations Branch. His May 1974 memo and testimony was "replete with inconsistencies, ambiguities and contradictions."

- The testimony and exhibits submitted to support CALTRANS compliance with CEQA were "so ambiguous and inconsistent that it is impossible to determine exactly what procedures were followed..."

Major Federal Action-NEPA

- UMTA funding cannot be severed from project operation funding; they constitute one project.
- UMTA, under NEPA, failed to comply with its own rules regarding what constitutes a major action and the court found UMTA not in compliance with other regulations regarding environmental analysis, public hearings, etc., concluding that no independent evaluation of environmental impacts had occurred and a negative declaration was "unreasonable and unsupported by evidence...."

CAA Exemption

- There is no EPA-approved CALTRANS Transportation Control Plan (TCP) so that the controlling TCP is the EPA promulgated one of November 12, 1973. This plan does not require preferential lanes on the Santa Monica Freeway, so the project is not "an action taken pursuant to the Clean Air Act."
- The project is not exempt from NEPA regulations.

Functional Equivalent

- No studies showed environmental effects of the project had been sufficiently analyzed, so functional equivalent does not exist.

Judge Byrne took an active role in the trial, often giving clarifying statements amidst much confusing testimony. He was clearly concerned with the apparent lack of environmental analysis documentation which would support the conclusions by the agencies that the project would have no significant impact on the environment. A reading of the document "Findings of Fact and Conclusions of Law" presents the details of non-compliance with environmental laws and the evidence considered to reach that judgment (Reference 4).

9.3.4 State Legislative Activity

During the period of Diamond Lane operation, legislative activity in Sacramento produced three bills affecting the Los Angeles area. Two bills, AB 4525 and SB2205, dealt specifically with the Diamond Lane project, and AB 1246, first introduced in 1975 and after many amendments, redesigned transit operations in

Southern California. Reportedly, (see editorial, Exhibit 9.13), SCRTD's part in the Diamond Lane project was another grievance against the agency. Specifically, SCRTD was no longer charged with the development of rapid transit planning but was defined as a bus operator. AB 4525 was introduced on June 14, 1976 and was associated in the press with three Southern California Assemblymen: Antonovich (R-Glendale), Vicencia (D-Bellflower), and Rosenthal (D-Los Angeles). The bill attempted to deny the authority of CALTRANS to operate the Santa Monica Freeway Diamond Lane project by repealing Section 25485 and 25486 of the Public Resources Code established by the Warren Act (AB 918) as well as sections of the State Highway Code and the Vehicle Code, Section 21655.5. On June 23, it was not passed out of the Assembly Transportation Committee because the 6 to 4 vote lacked the 8 votes necessary. Reconsideration was granted and, on August 4, the 15-member committee again considered it, but a 7 to 7 vote this time still lacked the necessary eighth vote to pass. Assemblyman Vicencia voted against his own legislation, and stated he did so because Governor Brown promised to evaluate the project before the one-year trial period. There was also some concern expressed that the State might lose highway dollars if such authority to establish diamond lanes were taken away from CALTRANS.*

Senate Bill 2205, introduced in the Senate transportation committee on August 3, was similar to AB 4525 in asking for a repeal of CALTRANS authority to continue the Santa Monica Freeway Diamond Lanes. The most outspoken proponent of the bill was Senator Cusanovich (R-Woodland Hills in the northwestern Los Angeles area). The bill also asked that any other preferential lane projects be approved by the legislature before being established. By a 5 to 1 committee vote, the bill was passed on for full Senate consideration. The Senate passed the bill, but it was then held up in the Assembly with no committee hearings on the bill.

9.3.5 Diamond Lane Violations**

For the first few days of the new lane operation, warnings were given to drivers who violated the law by driving in the lane with less than three people in their car. By April 21, in the sixth week of the project, California Highway Patrolman Sergeant Helsel reported that 2,632 tickets had been issued for such a violation. This number of tickets is an estimated 12% daily violation rate based on CALTRANS figures*** which show the number of daily violators to have been 15.4% of the Diamond Lane's traffic for the first four weeks and a range of 10.9% to 18.4% average daily violators over the 21-week project, or about 1% of all traffic on the freeway.

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*One such reference was in the Los Angeles Times article "Diamond Lanes Backed by State's Energy Board," June 24, 1976.

**For an analysis of violations, see Section 7.2.

***Page 14 of the Evaluation Report on the Santa Monica Freeway Diamond Lane Project After 21 Weeks of Operation, CALTRANS, September 1976. Table is also shown as Table 7.2, Average Daily Violations, in Section 7 of this report.

EXHIBIT 9.13

LOS ANGELES TIMES
6 —Part II FRIDAY MORNING, AUGUST 27, 1976

None Too Soon

The California Legislature has reorganized the control of transportation in four Southern California counties in a constructive manner that should go a long way toward improving coordination and restoring local control.

Under the legislation, Los Angeles, Orange, San Bernardino and Riverside counties each will have its own transportation commission, with control over highways, freeways, buses and other forms of transit.

For Los Angeles County, this means that at last there will be a super agency to settle the squabbling that has sometimes marred the relationships among the Southern California Rapid Transit District, the California Department of Transportation, the municipal bus lines and local political bodies.

The legislation is the work of Assemblyman Walter M. Ingalls (D-Riverside). He worked for two years, much of the time in the face of bitter opposition from such entrenched interests as the RTD, to win approval. In the end, only one negative vote was cast in the Legislature, and even the RTD came over to his side.

It is no secret that the RTD's bad reputation in Sacramento helped win passage. The legislators have little respect for the RTD. They were also aware of the two defeats in two years of rapid transit ballot propositions, which said something about public divisions in Los Angeles County. And the ill-considered imposition of the Diamond Lanes on the Santa Monica Freeway by Caltrans gave further impetus to the legislation.

The bill provides for an 11-member commission for Los Angeles County, composed of the mayor of Los Angeles and five members of the County Board of Supervisors, or their delegates, plus a city council member from Long Beach, two persons appointed by the Los Angeles mayor with council concurrence, and two persons appointed from the other cities by a city-county selection committee.

The work of the commission will be financed by diverting 1% of the county's share of state funds from the sales tax on gasoline; next year the amount will be about $700,000.

Among the most important tasks of the commission will be the development of a master transportation plan, including freeways, highways, bus routes and rail lines. Each year the commission will decide on the priorities within that plan as the basis for distributing millions of dollars in federal and state funds.

The commission will control all federal and state funds for transportation within the county, with some minor exceptions. A modest state gasoline tax direct subsidy will be maintained for the seven municipal bus lines. Caltrans will keep control over freeways of statewide significance and highway maintenance, operations and safety funding.

No new fund-raising authority will be given the commission, but it will inherit on Jan. 1 the authority at present vested in the RTD to seek voter approval of a sales tax of 0.5% for general transit purposes.

The new commission will go into operation in January, none too soon to try to sort out the enormous transportation problems that have accumulated in Los Angeles County.

By June 1, the Los Angeles Times* reported that over 4,000 motorists had been cited by the CHP, but few citations were fought in court. An estimated 5,830 citations were issued during the project for violations in the Diamond Lane, plus another 3,338 for violating the two-occupant per car requirement on-ramp bypass lanes, and 6,366 warnings.

Fines were reported to be $15.50 in Los Angeles courts and $20.00 in Santa Monica by the Evening Outlook newspaper, which estimated that if all fines were paid in Los Angeles, over $40,000 had been collected so far.** However, the fines were set at the judges' discretion. Some judges set cases aside pending the outcome of the trial and then dismissed them.

In an interview, reported on May 7,*** Los Angeles Municipal Court Commissioner Nancy Brown said she dismissed about one-third of the Diamond Lane traffic cases. Commissioner Brown said she inspected all the on-ramps, and said not enough information was posted and that "poorly placed signs and signals on some...on-ramps has resulted in confusion and unnecessary court cases." Later quoted in the Los Angeles Times,* she said about one dozen citizens had court trials over Diamond Lane violations. Eight of the cases she held under submission "pending higher court decisions on the Vehicle Code section which gave Caltrans the authority to establish the Diamond Lane program." In the same article, Commissioner John D. Harris recalled that of about 21 court cases in the past two weeks, he found 11 guilty and 10 not guilty. The article stated that Harris "believes a good many drivers with Diamond Lane infractions often have legitimate gripes, as does most of the motoring public."

On June 3, an organized "revolt" of motorists against the Diamond Lane deliberately violated the three or more car occupancy rule by following a symbolic hearse into the Diamond Lane. Twenty citations were reportedly given. Their case was transferred to the San Fernando Valley court, where the judge dismissed it.

9.4 INSTITUTIONAL AND POLITICAL CLIMATE

The prevailing political weather during the Diamond Lane project was stormy. This condition was intensified by several background factors:

- The complexity of transportation planning, financing, and decision-making in the Los Angeles area;

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*"Few Violators Choose to Fight Tickets in Court," Jerry Belcher, Los Angeles Times, June 1, 1976.

**"Diamond Lane Makes Money," Evening Outlook, April 23, 1976.

***"SM Freeway Confusion Told," David Jonta, Evening Outlook, May 7, 1976.

- The changing philosophy, policies and personnel in the State transportation agency; and

- The implications of the Clean Air Act.

All these factors existed in a setting where transportation plans have proliferated but conditions do not appear to improve. Los Angeles has a history of controversy and little action as well as enormous transportation problems. Public and press alike comment that Los Angeles needs a transit system but in eight years, three attempts to bring a rapid transit system into operation have been voted down by the public. SCRTD already runs an extensive bus system. Meanwhile, the problems of air pollution, energy consumption and traffic congestion remain, and the existing bus system is perceived as an inadequate solution to these problems. Federal funding is currently being sought for a transportation package which includes a downtown people-mover, a rapid transit starter line, more buses and preferential freeway lane projects.

Policy and plans are a beginning; they are tested in the areas of political feasibility and the implementation of projects. The delivery of improved transportation services in a community comes from both the institutions with transportation responsibilities and the political agreements necessary to carry out programs. The opportunity exists as well to inform this process with public input, through their elected officials, public hearings, committees, forums, etc.

The Diamond Lane project for the Santa Monica Freeway looked promising to planners and politicians alike in its early planning stages. It was to be one of several low-cost, short-range, incremental approaches to improving the transportation situation and the air quality problem in the South Coast Basin by 1977, as ordered by EPA. Some of the problems that arose as the project moved into the implementation stage had to do with the transportation institutions involved and with political figures and project personalities. This section will examine the Diamond Lane plan development; the role of institutions in the Diamond Lane demonstration; and the vocal local opinions of personalities, politicians and public officials involved in the project.

9.4.1 Diamond Lane Plan Development

In the background of the preferential lane for the Santa Monica Freeway were two developments: the emphasis on better use of existing highway facilities due to the reduction in new highway construction and the EPA proposals for the Los Angeles area stemming from the Clean Air Act of 1970. Whatever the compelling act or bill, the Diamond Lane plans were developed at the local level by agencies with transportation responsibilities and with the knowledge of public officials.

In 1973, EPA proposed a transportation control plan for the South Coast Air Basin to achieve federal air quality standards. An ad hoc task force of State and local officials felt EPA's plan was not feasible, and proposed an alternative 13-point "Clean Air" plan, which included two preferential lanes on the Santa Monica Freeway. Given this input, EPA modified its plan and issued a new one in November 1973, but the Santa Monica Freeway lanes were not specified.

Also at the local level, a plethora of plans were being developed at CALTRANS, SCAG, SCRTD, County and City levels for buses on both city streets and freeways. In October of 1973, Senate Bill 1221 passed which ordered SCRTD to prepare a comprehensive plan for development and operation of preferential facilities for high-occupancy vehicles. This plan was produced by Wilbur Smith Associates in March 1974. The Senate asked CALTRANS as well to make "appropriate" freeway lanes available in metropolitan areas for "exclusive use of public transit buses and multiple-occupant motor vehicles during commute hours."

In the same month, SCRTD issued a "Public Transportation Improvement Program" produced by a group of consultants (as part of a larger study, "Alternative Transit Corridors and Systems"), stressing a near-term (1-3 years) program for transit improvements in the region including pilot projects of priority treatment for buses on freeways (including Santa Monica). The package of improvements to get Los Angeles transportation moving forward was voted on in the form of two 1/2¢ sales tax proposals for capital and operating needs and was defeated.

SCAG was also developing its Short-Range Transportation Plan (approved on 4-11-74) to meet federal and state requirements for a regional document of all transportation-related activities proposed for the next five years. This document was to serve as a basis both for formulating an energy conservation plan and for meeting the EPA requirement to improve regional air quality measurably by 1977. The Santa Monica Freeway preferential lane project was included among the actions recommended in the plan as a pilot study. The project was also incorporated in the regional transportation plan (Reference 5), the area's input to the development of the State transportation plan.*

Two Los Angeles City Councilmen and two County supervisors were on the SCAG committee which approved the plan and its preferential lane program. CALTRANS was given the responsibility for developing and implementing the experimental program on the freeways. The

*This regional planning process included public hearings. Despite SCAG's efforts, these hearings were poorly attended, which was attributed to the difficulty of drawing any sizeable audiences on regional issues. Rather it is "site specific" or local projects which draw the attention and therefore the audience. Thus, the Santa Monica Freeway Diamond Lane, as one of the many projects in this plan, remained relatively obscure to the public until announcements of the project opening began.

resulting plan for CALTRANS District 7, "A Program for Preferential Treatment," was issued in Los Angeles in July 1974 and was aimed toward air quality improvement and energy conservation. The Santa Monica Freeway preferential lanes appeared as a pilot project.

In April 1975, the Regional Transportation Plan, incorporating sub-regional plans such as those of CALTRANS District 7, SCRTD, etc. was approved as the area's compilation, assessment, and policy input for the State plan. This approval came from the SCAG Executive Committee which included two representatives of the County Board of Supervisors, two Los Angeles City Councilmen, and the Mayor of Los Angeles.

Working with CALTRANS District 7, SMMBL and the CHP, SCRTD put together a grant application to UMTA for financial help with data collection, marketing and public information aspects of its pilot project on the Santa Monica Freeway. The grant was approved in April 1975 and SCRTD became the funnel for the grant money.

In September 1975, AB 918 -- a transportation energy conservation bill -- was approved which, among other things, encouraged CALTRANS "to establish, as soon as possible, preferential lanes for the use of buses and three-passenger carpool vehicles on the Santa Monica Freeway...as a pilot project." At that time, the project was scheduled for a September 29, 1975 opening, and Los Angeles City Traffic and Off-Street Parking Committee reported to the City Council that "an exciting, innovative experiment is being tried in Los Angeles..." Also, "A great deal of work has been done and a great deal must still be done to coordinate the efforts of all the involved agencies."

9.4.2 Institutions With Diamond Lane Roles

Problems existed within the institutions responsible for implementing the Diamond Lane project: CALTRANS and SCRTD were both undergoing change and turmoil. Two other institutions with project roles were also having problems: the County of Los Angeles was experiencing financial difficulties, and the City of Los Angeles was not an integral part of the project planning. In the background were federal institutions and agencies interested in the project.

CALTRANS was the lead institution in the Diamond Lane project, involving both its Sacramento headquarters and its Los Angeles District 7 office. This institution undergoing a period of great change.

CALTRANS was established in 1972 by Assembly Bill 69 with the hope of engaging the State in multimodal and comprehensive planning in cooperation with local, district, and regional transportation agencies. Assembly Bill 69 also required the new CALTRANS to develop a State transportation plan from the input of plans from the State's regions. The old State Highway Department, formerly engaged in the planning, construction, and maintenance of State highways, was expanded to all facets of public transportation from financing and planning to maintenance of systems, although it could not directly plan, construct or operate public transit facilities. This new role for the former highway department developed during a time of inflation, when funds for new highway construction were limited. During the transition stage and given the reduced construction role, there were significant cutbacks in CALTRANS personnel.

The shift to the maintenance of the present highway system, with plans to better utilize the system by increasing its people-carrying capacity through encouraging high-occupancy vehicles, dovetailed with the policies of the new administration of Governor Brown (1975). The now familiar philosophy of "lowered expectations" and "limited resources" was translated into statements about the end of unlimited freeways, emphasizing filling in the remaining gaps and maintaining the existing system, the encouragement of mass transit and the better use of the system in place.

When the project was still in the planning stages, Secretary of Business and Transportation Donald Burns was appointed by the Governor; the Director of CALTRANS was fired; an acting director started staff layoffs; and in March 1976 a new director, Adriana Gianturco, took office. The change of faces in Sacramento was matched by a changing of the guard at the Los Angeles district office. Early project planning figures H. Ayanian, District Director, and A. Himelhoch, Deputy District Director, left CALTRANS before the project opened; their tasks were assumed by R. Datel as Director and Chuck Ford as his Deputy. The reassignment of district staff personnel and the shifting of project responsibilities caused many problems in planning continuity and data collection. On the grounds of being shorthanded, data for evaluation purposes was not collected or was collected incompletely, particularly data reflecting the "before project" conditions.

To quote the new District Director, R. Datel: "This is the most difficult project we've had, and it comes during the most difficult management era we've had..."

SCRTD was in troubled times as well. The legislature created SCRTD in 1964 with Senate Bill 41 to fill "an imperative need for a comprehensive mass rapid transit system in the Southern California area, and particularly in Los Angeles County." The bill stated that SCRTD was to operate the existing bus system and to plan, develop, build and operate a modern rapid transit system. SCRTD's short-range plans included expansion of its bus fleet and service, but its longer-term plans had focused on the development and operation of a new transit system. During the Diamond Lane project, SCRTD's third bid to build and operate such a system was voted down. In August 1976, the legislature voted to remove rapid transit planning responsibilities and leave SCRTD as an operator of the bus system or any future rapid transit system.

Prior to March 15, two uncertainties occurred to make the Diamond Lane bus operation appear tentative. The Board of Directors* of SCRTD, which sets the District's policies delayed the project start until a dispute over federal labor restrictions imposed by Section 13(c) of the National Mass Transportation Act of 1974 could be settled. Receipt of federal operating subsidies (Section 5 funds) was conditioned on the protection of transit employees (13(c)). The implications of Section 13(c) came to the Board's attention prior to a proposed September Diamond Lane opening, and they feared being locked into an unfavorable position. The local concern was that under the provision, when SCRTD hired new personnel for its new services (the Diamond Lane being one of four planned), it would be obligated to keep them on or not to lessen their position, and possibly pay their salaries for up to six years if the project was terminated and no suitable jobs were found. County supervisors were alarmed as well. Supervisor Schabarum said 13(c) called for "unrealistic guarantees to all District employees as a condition for federal operating assistance." He went so far as to propose rejection of $26 million in federal assistance rather than sign the national agreement. The 13(c) controversy was one reason for the rescheduling of the project to March 15, 1976. After much objection, SCRTD signed the national agreement without change.

The second uncertainty involved the County Board of Supervisors upon whom SCRTD (and SMMBL) depended for subsidy funding for the new service. The Chief Administrative Officer (CAO) of the County, Harry Hufford, had recommended that all new transit projects be delayed until July 1 due to the expected year-end cash flow shortage of the County. Such an action would retain $1.7 million in the County's general fund to meet its cash needs. Two weeks before the project start, the Supervisors voted to table the CAO's recommendations and supply the funds. Funding for the project in the following year's budget (beginning in July), however, remained a subject of concern and debate after project initiation, contributing to the project's already tentative atmosphere.

The Los Angeles County role, through its Board of Supervisors and the County Road Department, was limited to approval and financing of the project through a subsidy to the operation of the new service. It was not a trouble-free situation, however, given the County's financial constraints. The uncertainty of the subsidy was raised with the County's expected cash flow shortage at the end of fiscal year 1976, when Supervisor Hahn introduced motions** in late March to end the project, and when the SCRTD budget for the fiscal year beginning July 1 came up for consideration.***

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*The Board consists of eleven members: five appointed by County Supervisors; two from the City of Los Angeles; and four representing other cities in the district.

**The motions were carried over for several meetings; one was defeated in mid-June; another was related to SCRTD's budget hearings and did not come up for a vote.

***The budget which was finally approved was based on a fare increase and included among other changes a surcharge for Diamond Lane bus riders and a reduction in Diamond Lane service.

Diamond Lane votes among the Board of Supervisors were typically split three to two in favor of the project, with Supervisors Hahn and Ward taking an anti-project position. A sampling of Supervisors' comments was noted on a June 15, 1976 vote on Supervisor Hahn's motion to ask Governor Brown to direct Ms. Gianturco to stop the project follows:

Supervisor Schabarum: No, this is an experiment which needs time, not necessarily a year. I'll assess it on a regular basis.

Supervisor Edelman: No, despite the inconvenience and substantial opposition, it has been in operation for only a short time. There have been increases in use and it is a project of great significance.

Supervisor Hayes: No, although I object as I don't like to see lifestyles interfered with. Our Los Angeles rapid transit system is the auto. I think the Diamond Lane concept is not a problem but the manner in which it was done is. CALTRANS is trying to implement what EPA demands. I would prefer voluntary means to achieve air quality.

Supervisor Hahn: Yes, it's a flop.

Supervisor Ward: Yes, I find it unsatisfactory from my own experience.

The City of Los Angeles had no formal role in the project other than an information and advisory one before August of 1975. When an opportunity existed, the City had not voted funds to be a project participant. To insure coordination of project activities, particularly with the City Traffic Department, the City Council voted to support the project, but included a recommendation that an operations management team be formed which would include the Joint Project Board plus City representation from the Traffic Department and the Los Angeles Police Department. Through this team, the City hoped to have a voice in the planning and operation of the project, as well as the ability to resolve disagreements between project planners and the City. While some issues were resolved (e.g., left-turn prohibitions), project decisions were made by the Joint Project Board. The City did not want the project viewed as an experiment, but as a short-term improvement which led them to be concerned with what they considered arbitrary aspects of the project. Project planning concerns* included:

- A project redefinition to include a phased introduction of various aspects of the project, two-person carpools, new bus service before preferential treatment, etc.

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*For a fuller treatment of City concerns, see Reference 6, "Transportation Planning in Los Angeles," prepared by the Office of Research, Office of the Mayor, March 1976.

- Planning for public response (a telephone center was initiated at the City's urging);

- Emphasis on incentive versus disincentive aspects;

- Planning for the implications and effects of the project, such as surface street congestion;

- Success or failure measures for the project or at least some range of tolerance; and

- Flexibility in decision-making, given the controversy expected as well as an open decision-making process with local participation and accountability.

In the project background was the federal Urban Mass Transportation Administration (UMTA) whose programs have been the major financial stimulus to the development of mass transit system through its capital grant, loan, demonstration and operating subsidy programs. UMTA staff wanted to learn from the Diamond Lane demonstration of preferential treatment on a freeway for possible application to other areas. UMTA had four financial roles related to the Diamond Lane project:

- Funds to the Federal Highway Administration for expansion of its home interview survey sample;

- Demonstration funds, channeled through SCRTD, in response to a grant application from four agencies to perform data collection, marketing and public information tasks to support the preferential lane project;

- Service and methods demonstration funds through the Transportation Systems Center (TSC) to contract for a project evaluator (SYSTAN, Inc.); and

- Capital funds to SCRTD to buy buses as part of its transit improvement program.

On April 24, 1976 C. Kenneth Orski of UMTA's Policy and Program Development Group stated at a Los Angeles area conference that, "I do not view the Santa Monica Diamond Lane as a device to discourage automobile use. Rather, I see it as a way of increasing the people-carrying capacity of that freeway corridor...(which) is already running at near-capacity. At the same time, no new freeway or rail transit facilities are likely to be built in the foreseeable future. The only course of action open is to try and make the existing freeway perform better." He went on to say that if, "after a suitable period of time, the lane has not achieved this objective, it will not have proven its worth as a transportation system management concept....as the saying goes, if it works in Los Angeles, it will work anywhere."

Another federal agency influencing the Diamond Lane project was the Environmental Protection Agency (EPA). Congress created EPA to coordinate federal action on behalf of the environment. EPA sets the standards for permissible levels of major types of air pollutants and noise, and is empowered to enforce its standards by directly regulating noise and air pollution sources. In the absence of State or regional action to accomplish the national objectives, EPA is required to develop, propose and implement regional programs toward comprehensive environmental protection activities. (See Section 9.4.1 for the history of EPA plans for the Los Angeles area.)

The Diamond Lane project was viewed by CALTRANS and others as a response to EPA's mandate for improving Los Angeles air quality by reducing the vehicle-miles traveled (VMT) or face gasoline rationing in May 1977.* The ninth Circuit Court of Appeals, in March 1976, upheld the power of EPA to impose such restrictions. To stave off such action, two possibilities were seen: congressional changes to the Clean Air Act or demonstrations of feasible transportation alternatives to achieve a reduction in VMT. The Diamond Lanes were part of a plan to find such feasible alternatives.

Offering encouragement from the sidelines were three State agencies and the regional agency, SCAG.

The State Transportation Board is a planning and advisory body for the State. The board is required to adopt and send to the legislature a California Transportation Plan, review annual CALTRANS budgets for consistency with the plan, and monitor plan implementation progress, among other tasks. The board had approved the Diamond Lane project and in late May 1976, publicly praised CALTRANS for the project.

The Air Resources Board (ARB), part of the State Resources Agency, is responsible for adopting and enforcing vehicular emissions standards. It also adopts ambient air quality standards for the State's basins and prescribes stationary source emission standards, the latter to be enforced by County Air Pollution Control Districts. Tom Quinn, head of the ARB, was quoted early in the project as saying the Diamond Lanes would have little effect on air quality in the basin. Later, Mary Nichols of the ARB accompanied Director of Transportation Gianturco to a Board of Supervisors meeting in mid-June and said the ARB was watching the project closely as one of the projects to reduce VMT and, while the effect on air quality was impossible to tell now, some improvement had been noted. She emphasized the need to complete the experiment and compare it with the San Diego project to come.

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*Though it was generally agreed that EPA was not going to enforce gasoline rationing in the Los Angeles area, the Clean Air Act remained unamended during the project.

The State Energy Commission came into existence as part of the Resources Agency in early January 1975. It is required to prepare a plan of action to be authorized by the legislature to deal with possible energy shortages which may occur in the future. In June, the Commission held a meeting in Santa Monica at which they listened to Transportation Director Gianturco speak of the Diamond Lane project, and the Commission then publicly backed it.

The Southern California Association of Governments (SCAG) is a large (over 50% of the State population is in this region) voluntary association of the local governments of Los Angeles, Orange, Ventura, San Bernardino, Riverside, and Imperial Counties. SCAG's transportation functions are in the areas of planning and finance. SCAG serves as the (A-95) clearinghouse to review all local plans submitted for State and federal funding, and is the regional planning agency responsible for developing the Southern California regional transportation plan input to the State Plan and the short-range transportation plan. Implementation of projects is done by CALTRANS, transit districts, counties and cities. However, transportation planning and implementation in the region is characterized by institutional complexity. While SCAG planning provides a regional framework, it is not well linked to implementation or to resolution of issues. The voluntary nature of the organization makes such tasks difficult.

As a part of SCAG short-range plan, the Diamond Lane project was approved by the instituion, monitored for its duration and supported. SCAG's executive director, in a letter dated March 31, 1976 to the Los Angeles Times, said "CALTRANS, SCRTD and the County of Los Angeles have initiated the Diamond Lane Project in good faith as one method of trying to provide positive encouragement for people to share rides and greater utilize our existing bus service. Rather than an immediate rejection of this experiment, it would be hoped that modifications could be made in the current program which alleviate some of the congestion difficulties as well as the safety hazards which have become evident in the current proposal."

9.4.3 Vocal Local Opinions

Much of the clamor surrounding the project was punctuated by the frequent public statements and actions of several political figures and the Los Angeles City Traffic Engineer. Added to these were the organized pro- and con-lane groups which were formed, and a number of Los Angeles visitors who offered their opinions as well.

Two Los Angeles City Councilmen -- Marvin Braude and Zev Yaroslavsky, both representing West Los Angeles -- were prominent local critics of the project. Councilman Braude, Chairman of the City's Traffic and Off-Street Parking Committee and a key project figure in the City Council, maintained involvement with the project both before and during its operation and participated in numerous meetings with project personnel. Councilman Braude stated that he was concerned with the arbitrary nature of some aspects of the project which he felt would be unacceptable to the public. For example, he made it clear before the project opening that he would oppose it unless the operating hours were changed from a 13-hour operation to peak hours of operation.* The hours were changed on February 6.

In mid-April, Councilman Braude recommended other changes he felt would improve the project, including opening the lanes to two-person carpools,** shortening the total hours of operation from eight to four, restricting use to peak direction only, and changes in metering rates. In early May, the hours of operation were shortened by one hour. In mid-June, Councilman Braude called a press conference to announce that the Traffic Committee would hold a public meeting on the project to obtain citizen input. He also asked CALTRANS to appear and justify the project's continuation, since on the basis of what he had seen, the project had failed. He said "it has become abundantly clear that CALTRANS has no intention of making substantive changes in the basic format of the Diamond Lane." Later, the Traffic Committee held a hearing to take technical testimony. From these hearings, the Traffic Committee was to make project recommendations to the full City Council. In City Council meeting on August 3, Councilman Braude said his greatest concern about the project was the increase in accidents, but it was also social experimentation by government, was lacking in criteria or goals, and was not going to improve. Following more debate, the City Council voted 10 to 4 on Councilman Braude's motion to ask CALTRANS to terminate the project.

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*This change was a further reduction from the original 24-hour operation planned. A compromise with the City Traffic Department had reduced the hours of operation to 13.

**One of the persistent issues during the project was whether the definition of carpools using the Diamond Lane would change from three or more to two or more in a car. There was a great deal of public sentiment for the change. In early May when CALTRANS announced the shortened morning project hours, there was talk of studying the carpool definition question. One radio station reported that results of the carpool decision would occur in three weeks (the eleventh week). This item was not mere speculation; Secretary of Business and Transportation Burns stated in a letter of May 13 to Councilman Braude that a decision would be made by May 27 (the eleventh week of the project). As that date approached, two stations reported a rumor that CALTRANS would modify the carpool defintion to two or more persons. The following week, Deputy Director of CALTRANS in Los Angeles Chuck Ford was interviewed and the story carried on two television stations. Mr. Ford stated that a decision on the "3-2" question was imminent, but there was no closure on the issue reported in the media.

Unlike Councilman Braude, Councilman Yaroslavsky had not been actively involved in the project prior to its implementation. However, he proved to be an early and outspoken opponent. He used many opportunities to speak out on the project in interviews, at meetings, press conferences, during the trial at which he was a plaintiff, and in debates. He explained his City Council vote supporting the project as a vote acquiesing to an apparent fait accompli. His rhetoric focused on putting an early end to the project.* He was quick to act and announce his actions: asking for an opinion from the City Attorney in the third week of the project about whether an EIR should have been filed; demanding an investigation into charges of the alleged harassment of City Traffic Engineer Sam Taylor; inquiring whether the City could incur liabilities by not making adjustments to provide for the safe flow of traffic on city streets; and asking for an investigation to ascertain if an EIR was required on the San Diego Freeway.

Sam Taylor, Los Angeles City Traffic Engineer, remained a controversial figure throughout the project.** City street operations were Mr. Taylor's long-time responsibility, and he objected to the way the Diamond Lane project was implemented, stating beforehand that it would increase traffic accidents on city streets. Data problems associated with Mr. Taylor have been discussed in other sections of this report. In summary, the untimely release of selected data was frustrating and confusing. For example, at a Board of Supervisors meeting considering a motion for termination of the Diamond Lanes, Mr. Taylor produced accident statistics to show the impact of the lanes on city streets. These figures had not been made available to project participants, but they had been released to the Los Angeles Times, causing Supervisor Schabarum to ask Mr. Taylor to offer such information to the Board members first. The CALTRAN-Taylor data problems, according to Mr. Taylor, stated were "a matter of politics." "They've thrown the gauntlet down and I don't know how else to respond than to say that this project along with other projects involving public transportation is actually feeding off a promise, actually a set of many promises. And most of these are political rather than professional."

In addition to the closely-held data, another area of controversy was the alleged harassment of Mr. Taylor. Early in April, he stated he was being pressured by CALTRANS not to make city street changes that would relieve congestion, thereby forcing cars

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*At one point in a City Council meeting, he held burlap sacks, suggesting Governor Brown could drop them over the Diamond Lane signs and end the project.

**Mr. Taylor had been a controversial figure for some time. In a Los Angeles Times article of August 18, 1975, it was stated that "He has been called stubborn, rude, intractable, iron-fisted, inflexible, hard-nosed, rapacious and quite possibly the best city traffic engineer in the world."

to use the freeway. Early in May he reported continued harassment,* and in his June 28 press conference, he said Director Gianturco was challenging his integrity on data. Early meetings were held between Mr. Taylor and the project agencies to try to resolve differences; later attempts were not successful. The staff of the Traffic Department continued to work with the Diamond Lane project team but were hindered by Mr. Taylor's recalcitrance.

County Supervisors Baxter Ward and Kenneth Hahn were prominent opponents of the Diamond Lanes. Supervisor Hahn called it a "flop" on the first day, and continued to do so. In a supervisors' meeting, he stated that "until there's a real energy shortage, there's no use (for the lanes)." He joined forces with Supervisor Ward in his campaign to promote a rapid transit ballot measure. Part of their publicity was that rapid transit would eliminate diamond lanes. This part of the campaign was widely covered when the two supervisors handed out pamphlets and bumper stickers at an on-ramp to the Santa Monica Freeway.

Citizens Against the Diamond Lane, a group estimated at 200 people, was organized by Randy Kirk of the marketing profession. The group held a demonstration at Governor Brown's presidential campaign headquarters in mid-May; staged a mock funeral procession of 50-60 cars on June 3; made an attempt to hang anti-Diamond Lane signs from a freeway overpass; staged a protest at CALTRANS district offices in July; and appeared at the public hearing and other meetings on the Diamond Lane, many wearing T-shirts printed with their logo. Mr. Kirk was an articulate and energetic spokesman for the group, and his activities were well covered by the media. At the public hearing in June, Mr. Kirk argued that the project was poorly planned and executed with no effective public relations efforts.

The group developed a brochure stating their opinion that the lane was unconstitutional, illegal, invidious, immoral, unworkable, expensive and had subversive aspects. The facts about the lane operation, as they saw them, were listed in the brochure as well. (See Appendix D for text of the brochure and a handout.**)

Citizens for the Diamond Lane was organized to promote the use of the Diamond Lane and to promote its positive aspects. It was formed at a meeting on May 20 with Director Gianturco and a number of Los Angeles citizens. The chief spokesman became Jim Zukor, who then appeared at Diamond Lane meetings, held press conferences, and replied to editorials. The group also developed a newsletter which was distributed on buses (see Appendix D for text).

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*Incidents reported by Mr. Taylor included such things as bees in his mailbox, a large rock on his front porch, phone calls, etc. These incidents were never investigated by the City Police Department since Mr. Taylor made no police report.

**Another group handing out leaflets was the John Birch Society; see Appendix D for text.

During the project, various visitors to Los Angeles offered their opinion of the project. In late March, Federal Secretary of Transportation Coleman came to Los Angeles and publicly urged that the project be given a chance to work and be viewed in a broader perspective. Russell Freeman of EPA reviewed EPA's role at a mid-June County Supervisors meeting and said a voluntary means to achieve air quality standards was unacceptable, so EPA looked for some degree of assurance, e.g., a funded program such as the Diamond Lane. While EPA did not want to impose gasoline rationing and Congress agreed, amendments to the CAA were still pending. Senator Cranston in a June 7 interview said he wanted to dispell rumors of a ban on the use of automobiles or gas rationing: "Neither of those steps will occur; it's true that present law requires Los Angeles to meet certain air purity standards by May of 1977 that just cannot be met." He suggested that the CAA would be amended to extend the deadline for communities taking steps toward clean air like rapid transit, diamond lanes, and emission control. An FHWA representative visited in late April to say that the federal government was supporting the project. In late May, S.I. Hayakawa visited Los Angeles on his Senate campaign tour and said he opposed the Diamond Lanes. Candidate Robert Finch followed him the next day, stating "it's the citizen coping again with a faceless bureaucracy." He was concerned about the increased accidents, but also said, "those figures that CALTRANS puts out are very slippery, indeed." (KCOP-TV News, June 1, 2:00 P.M.)

9.5 DIAMOND LANE SITUATION TO DATE

The Santa Monica Freeway Diamond Lane is gone, but the bus routes developed for the project continue although service has been reduced and the Park-and-Ride lots were discontinued on September 1. Despite early signals after the Diamond Lane trial that CALTRANS and UMTA would appeal the decision and ask for a speedy review, there has been no follow-through on the appeal filed in October. Project personnel report that the appeal has been dropped by both CALTRANS and UMTA and that environmental procedures are being reviewed. Most observers of the Santa Monica Freeway project feel that the project is dead. A CALTRANS spokesman stated no EIR will be made.

One result of the project and the court decision was to bring the entire high-occupancy vehicle (HOV) program in the South Coast Basin under question and review. There has been a "recycling" of the program now that there has been some experience with it, both negative and positive.* The program includes four types of project plans: concurrent flow on existing lanes (Santa Monica Freeway);

*Preferential treatment on freeways for buses and carpools has been a popular concept and at least one local example, the San Bernardino Freeway exclusive busway, has enjoyed some success.

concurrent flow on improved median shoulder (San Diego Freeway); busway on separated roadway (San Bernardino Freeway, in operation); and bypass lanes at metered on-ramps (Harbor Freeway).

Regarding these four types of plans, strong feeling has developed since the Santa Monica Freeway project that "taking away a lane" is unacceptable to the public. The San Diego Freeway "added lane" was opened to general traffic on January 31, 1977 after heated debate on the merits of Diamond Lane treatment for the freeway. The Transportation Improvement Program proposed for federal financing includes San Bernardino-type busway funds, but at this time its future is uncertain. Bypass ramps at metered on-ramps are in use in the area; more are planned.

The controversy surrounding the opening of the San Diego Freeway Diamond Lane was clearly inherited from the Santa Monica Freeway experience. The San Diego Freeway Diamond Lane was nearing completion of construction and was scheduled for a mid-September opening when CALTRANS had an advisory meeting with local officials in late June. There was considerable resentment during the meeting when local officials felt they were not being asked to be part of a decision-making process; rather, they were being presented with an already formulated project about to be implemented. On July 22, 1976, the Los Angeles Times reported that the San Diego Freeway project would be delayed. State Secretary of Business and Transportation Donald Burns was quoted as saying, "The opening is up in the air." Three problem areas were cited: the controversy over the Santa Monica project; the poor performance of SCRTD buses on a steep hill section of the freeway during a test run; and the negative attitude of several key public officials displayed at a recent advisory committee meeting for the project.

Three San Diego Freeway committees were formed: a technical committee including the CHP, SCRTD, and Los Angeles City Traffic Department; a policy advisory committee of locally-elected officials; and a citizens advisory committee. By late October, all three committees concluded that CALTRANS should open up the lane to regular traffic and at the same time conduct environmental studies. CALTRANS legal staff felt that only carpools and buses could legally use the new lane or changes would have to be made in the regional transportation control plan. Federal EPA and FHWA officials stated* that federal funds might be withdrawn if the lane were opened to all traffic. The lane was opened to general traffic on January 31, 1977 after California Governor Brown inspected the freeway and made the decision to open the lane, though this action was not to mean the Diamond Lane program had been abandoned.

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*Los Angeles Times, "U.S. Supports Caltrans in Dispute on Diamond Lane," December 11, 1976.

9.6 THE DIAMOND LANE "EXPERIMENT" AS A RESEARCH TOPIC

"The Diamond Lane is the handmaiden of literature," said a Los Angeles project participant. In addition to material for the press, the project sent college faculty and students into interviewing and writing sessions. The results were case studies on the institutional, citizen participation, cost/benefit, and freeway simulation aspects of the Diamond Lanes. These reports, plus one by the California Commission on Government Efficiency and Economy, another by Public Technology, Inc. and one policy background paper by the Southern California American Institute of Planners are listed below:

- Kruger, Abraham J. and May, Adolf D., "The Analyses and Evaluation of Travel Time as an Impact of Selected Traffic Management Measures on Freeways," Working Paper FR-2, Traffic Management Group, Institute of Transportation Studies, University of California at Berkeley, May 1976.
  - Using the model FREQ3CP, the ramp control and preferential lanes of the Santa Monica Freeway were simulated.
- Jones, David and Kinaja, Patricia, Technical Appendix to "Politics of Metropolitan Transportation Planning and Programming," draft, Transportation Systems Management, Institute of Transportation Studies, University of California at Berkeley, 1977.
- Marienthal, Kim, "Apathy, Revolt or Something in Between: A Report on Citizen Participation," for Federal Highway Administration, draft, 1976.
  - Case study: Santa Monica Freeway Diamond Lanes
- Gordon, Peter, "Costs and Benefits of Southern California's Diamond Lanes Experiment," highlights presented at public hearing of June 21, 1976. (Gordon is Assistant Professor, Economics and Urban and Regional Planning at the University of Southern California.)
  - He stated his calculations were rough and his anaalysis should be accepted with qualification, but "an annual net cost of about $6,340,000" could be associated with the project.
- Posner, Edward C., "A Model to Predict Benefits of Priority Lanes on Freeways" (undated). Posner is associated with the Department of Electrical Engineering and Jet Propulsion Laboratory, California Institute of Technology.
  - Posner's model, using the Santa Monica Freeway as an example, recommended priority lanes with two-person carpools; however, the ramp metering on the freeway was not part of his model.

- Casey, K., et.al., "A Case Study of the Diamond Lane Project on the Santa Monica Freeway," for Environmental Management Institute, School of Public Administration, University of Southern California, June 1976.
- Coss, Nancy, "The Santa Monica Freeway Diamond Lane Project: A Case Study," technical appendix in Volume 2 of "An Assessment of the Performance of the California Department of Transportation," by the California Commission on Government Efficiency and Economy (the "Little Hoover" commission), to be released soon.
- Public Technology, Inc., "The Diamond Lanes," Appendix II, Case Study - Santa Monica Freeway Project, for the Office of the Secretary, Department of Transportation, Washington, D.C., DOT-OS-60076, draft, 1976.
- Southern Section, California Chapter, American Institute of Planners, "The Santa Monica Freeway's Diamond Lanes: A Policy Background Paper on Preferential Facilities for High-Occupancy Vehicles," November 8, 1976.

CHAPTER 9 REFERENCES

1. Olsson, Mary Lou and Kemp, Michael A., "Urban Transportation and the Press: A Survey of Editorial Opinion," Transportation 5 (1976, pages 407-418.

2. California Department of Transportation, "Marketing Plan, Santa Monica Freeway Preferential Lane Project," revised August 18, 1975. (Prepared in anticipation of a September 29, 1975 project initiation.)

3. Corey Research, "Attitude and Awareness Regarding Diamond Lane Project on the Santa Monica Freeway," conducted for the Los Angeles Times, August 13-18, 1976.

4. U.S. District Court, Central District of California, "Finding of Fact and Conclusions of Law," CV No. 76-1153-WMB, filed September 10, 1976 (PLF et.al. vs. Donald Burns, et.al.).

5. Southern California Association of Governments, Regional Transportation Plan, Draft, January 1975.

6. Emerson, N.H., Smith, G.O. and Stern, W.P., Office of Research, Office of the Mayor, "Transportation Planning in Los Angeles" for presentation at the Conference on Transportation Pricing Alternatives, Transportation Research Board at Easton, Maryland, March 14-17, 1976.

SECTION 5

OTHER PREFERENTIAL LANE PROJECTS

10. OTHER PREFERENTIAL LANE PROJECTS

10.1 Introduction

This section compares certain aspects of the Santa Monica Diamond Lane project with other preferential lane projects in the United States. Four other projects were selected for comparison: I-95 Freeway, Miami; South Dixie Highway, Miami; Banfield Freeway, Portland; and Marin U.S. 101 Freeway, Marin County, California. Table 10.1 provides a comparison of preferential lane characteristics and operational data. Five of the major points which appear in Table 10.1 are summarized in the following discussion; these are:

A. Physical characteristics;

B. Violation rates;

C. Accidents;

D. Bus ridership; and

E. Carpools.

10.2 Physical Characteristics

I-95 Freeway, Miami. On this 7.5-mile freeway segment, a new barrier-free preferential lane for buses and carpools was created from the median shoulder. There are three and four lanes in each direction.

South Dixie Highway, Miami. This is a 5.5-mile segment of a divided highway which runs north to the central business district of Miami. An existing concurrent-flow lane was reserved for carpools (two or more persons) and a contra-flow lane for buses. There are three lanes in each direction.

Banfield Freeway, Portland. On this freeway segment (3.2 miles inbound and 1.7 miles outbound), a new barrier-free preferential lane for buses and carpools was created from the median shoulder. The roadway has three lanes in each direction overall, with one four-lane segment.

Marin U.S. 101 Freeway. On U.S. 101 north of the Golden Gate Bridge, a 3.9-mile northbound contra-flow lane has been established. From the Richardson Bay Bridge north, new 3.8-mile northbound and southbound concurrent-flow lanes for buses and carpools were created from the median and shoulder.

On all of these projects except the South Dixie Highway, a new lane was created from the median and/or shoulders; on South Dixie, as on the Santa Monica Freeway Diamond Lane project, an existing lane was reserved. None of the projects have barriers

TABLE 10.1: A COMPARISON OF PREFERENTIAL LANE PROJECTS

Project	Roadway	Length (Miles)	# Lanes in each direction	Lane Reserved for	Origins	Start Date	Operating Hours	Violations	Officers Deployed During Peak Per.	Accidents/MVM
Miami I-95	Freeway; no barrier	7.5	3 & 4	Buses and carpools (2 or more more occupants)	New lane created on median	12/75 (short span in 7/75)	6-10 AM; 3-7 PM	High; 55-65% to start; 35-40% after 1 year	AM:2-3 PM:2-3	Accidents increased sharply during first 2 months of operation. Then dropped back to about "before" period level. Two serious accidents due to absence of distress lane. "Before":3.6/MVM; "after" 3.4/MVM
U.S.1 South Dixie Highway	Arterial Highway; no barrier	5.5	3	Buses & carpools (2 or more occupants)	Existing lane reserved. Contra flow bus lane initially; later change to bus & carpool with-flow lane	7/22/74	Start 6-9 AM; 4-7 PM later revised to 7-9 AM; 4-6 PM	Start 15%; now approx. 5%	AM: 8 PM:10	Accident rate doubled initially, then dropped when left turns were prohibited; accidents about 37% higher than "before" after 1 yr. (6/75). Before:6.4/MVM; after: 12.1 MVM. By Sept '76 only 15 to 20% higher than "before"
Portland	Freeway; no barrier	Inbound 3.2 Outbound 1.7	3 & 4	Buses & carpools (3 or more occupants)	New lane created from median shoulder	12/75	Start 24 hrs. reduced to 6-10 AM;3-7 PM peak direction only	High;30-40% in early'76. Decreased to 18% by July '76	Usually AM:2-3 PM:2-3 once per wk. saturation of 6 vehicles	"Before" 2.48 "After" 2.55
Marin	Freeway; no barrier	Bus contra-flow 3.9 Bus & carpool with flow 3.8	4	Buses & carpools (3 or more occupants)	New lane created from median & shoulder	Contra-flow lane '72; with flow bus lane 12/74 with flow bus & carpool lane 6/15/76	6-9 AM; 4-7 PM peak direction only	Before with contra lane NIL; now approximately 10-15%	AM: 4 PM: 5-7	"Before" 2.33 "After" (Dec '74-Dec'75) with exclusive bus lane: 3.81. Now with carpools: about same as Dec.'74-Dec.'75 period
Santa Monica	Freeway; no barrier	12.9	4	Buses & carpools (3 or more occupants)	Existing lane reserved	3/15/76	Start 6-10 AM; 3-7 PM; Cut to 6:30 to 9:30 AM; 3-7 PM	About 15% throughout project life. Predominately during first & last 1/4-hour of AM & PM operations.	AM: 10 PM: 9	"Before": 1.40 Ac/MVM; "After": 5.10 Ac/MVM; All lanes both direcions during exclusive lane period.

TABLE 10.1, CONTINUED

Project	Speed Differential	Traffic Volumes Before (Peak Hr.; Peak Dir.)* Now			Traveler Volumes Before (Peak Hr.; Peak Dir.)* Now			Public Response	Project Bus Ridership-Peak Per.			Carpools (Total Peak Periods)		
		Before		Now	Before		Now		Before	Start	Now	Before	Start	Now
Miami I-95	Pref.Lane:No data Other lanes: No data	(7/75) 0 3900 3900	 Pref Lane Other Lanes Total	(3/77) 1100 3500 4600	(7/75) 0 4680 4680	 Pref Lane Other Lanes	(3/77) 2255 4935 7190	Generally favorable but some criticism on lack of left distress lane. Favorable response to 2-person carpool.	NA	4/76 1669	(7/76) 1739	NA	(12/75[3] 437 Peak Hour Only	(3/77)[3] 1083
U.S.1 South Dixie Highway	Pref.Lane: 34.1 Other lanes: 23.3	(7/74) 2667 2667	 Pref Lane Other Lanes Total	(2/75) 689 1709 2398	(7/74) 3333 3333	 Pref Lane Other Lanes Total	(2/75) 1818 1955 3773	Generally favorable; a number of improvements were made to increase attractiveness of carpooling.	(7/74) 345	(7/74) 1251	(2/75) 1939	NA	(7/74) 3104	(2/75) 4075
Portland	Pref.Lane: 46.8; center lane: 41.1 Speed limit is 45MPH on all lanes.	(11/75) 0 3600 3600	 Pref Lane Other Lanes Total	(7/76) 194 3386 3580	(11/75) 0 4543 4543	 Pref Lane Other Lanes Total	(7/76) 1064 4554 5618	Generally favorable; much effort placed on explaining project prior to implementation & assistance in forming carpools.	0	(12/75) 199 Peak Hour Only	(7/76) 456	NA	(12/75) 157 Peak Hour Only	(7/76) 186
Marin	Pref.Lane:No data Other lanes: No data	(3/76) 100[1] 5470 5570	 Pref Lane Other Lanes Total	(3/77) 400 5400 5800	(3/76) 4000 7384 11384	 Pref Lane Other Lanes Total	(3/77) 5320 7890 13210	Generally strong public support received for with flow bus lane & carpool use of bus lane.	(3/76) 4000	(7/76) 3800[2] Peak Hour Only	(3/77) 4300	(3/76) 350	(7/76) 440[2] Peak Hour Only	(3/77) 400
Santa Monica	Pref.Lane:50 to 54 MPH Other lanes: 39.5 MPH	(4-5/75) 0 8730 8730	 Pref Lane Other Lanes Total	(Last 7 wks) 330 6905 7235	(4-5/75) 0 10779 10779	 Pref Lane Other Lanes Total	(Last 7 wks) 1608 8299 9908	Markedly unfavorable with strong media & political opposition.	Before 1171	Start 2496	21st wk. 3793	Before 2429	Avg. 1st-7 wks 4345	Avg. Last 7 wks 5749

NA - Data not available
* For Marin and Portland, peak hour data are listed; for other projects data represent an average hour during the peak period.

1. Buses only. Carpools began on June 15, 1976.
2. Reflects light summer volume and shift from buses to carpools during April-June 1976 bus strike.
3. Three person carpools in "start" period, two person carpools in "now" period.

between the preferential lane and remaining lanes. In the South Dixie Highway project, a carpool is defined as two or more persons; in January 1977, the Miami I-95 project also changed to two-person carpools. In the other three projects, a carpool is defined as three or more persons. All the preferential lanes operate only during peak hours.

10.3 Violations

Exhibit 10.1 traces reported violation rates on the five selected projects over time. All projects reported high violation rates during the opening days. Violations decreased considerably during the first several weeks of all the projects. On the I-95 Miami project, where enforcement is light due to budgetary constraints, violations were still 35% to 40% after one year. Both Portland's Banfield Freeway and Miami I-95 lack median areas with sufficient space to pull violators over. Enforcement could be more stringent, but it is believed that increased police activity could cause more accidents. The Portland violation rate has decreased from 30%-40% to about 20% since project initiation.

On both the South Dixie Highway and Santa Monica Freeway projects, the median areas are used for pulling violators over. Enforcement has been adequate and violations relatively low. In Marin, violations average about 15%-20% in the evening hours and about 5% in the morning hours. It is estimated that about one-third of the violators are tagged.

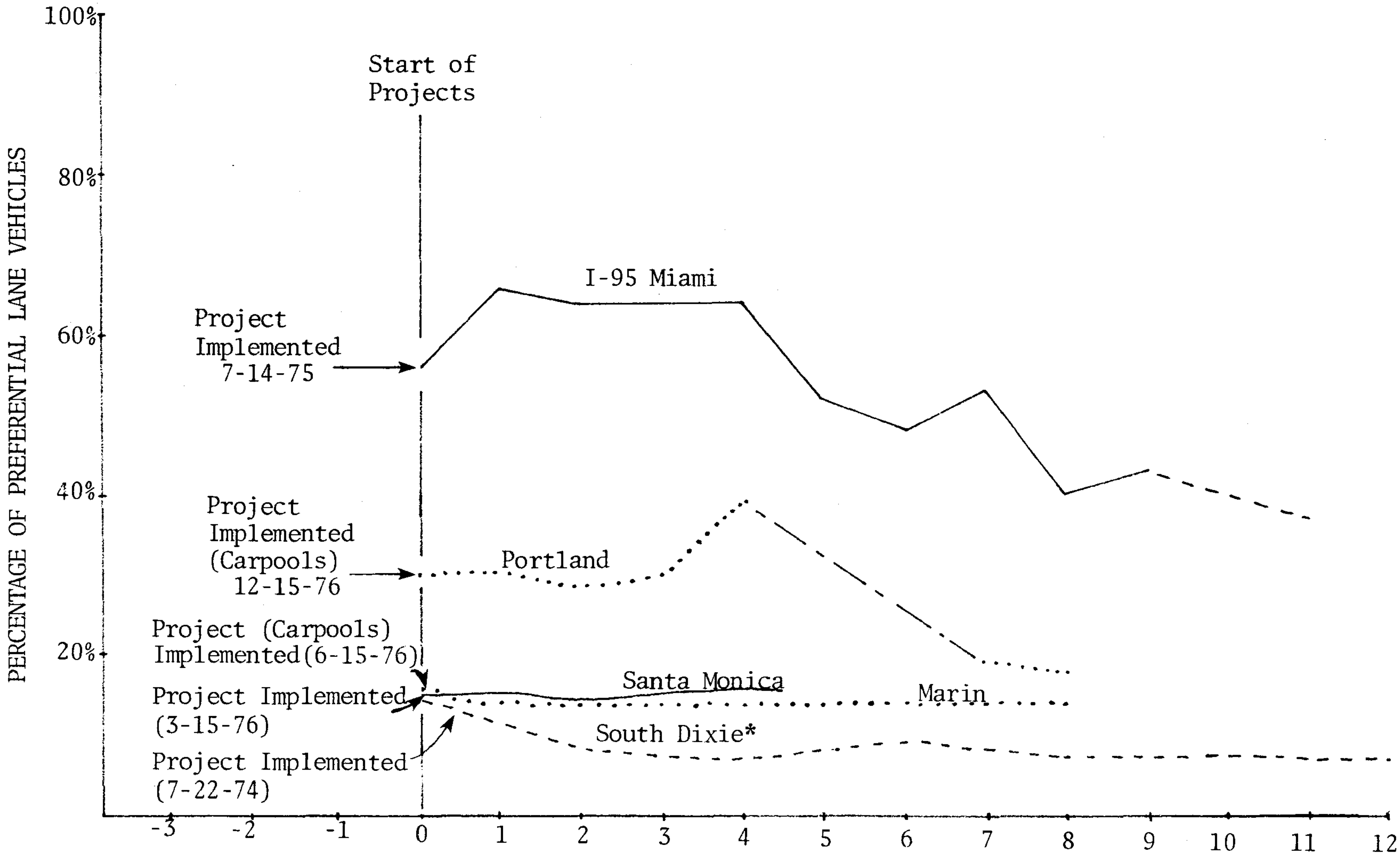
10.4 Accidents

Table 10.2 summarizes both injury accidents and total accidents per million vehicle-miles for each of the four project surveyed, in addition to the Santa Monica Freeway Diamond Lanes. Injury accidents are plotted as a function of time in Exhibit 10.2. Because accidents involving property damage only (PDO) are not reported uniformly in all states, reports of injury accidents provide a sounder base for comparing the various projects.

Of the five projects compared, the two with the highest increases in total accidents per million vehicle-miles over the "before" period are the Santa Monica Freeway and the South Dixie Highway, with accident rate increases of 264% and 89%, respectively. During both projects, accidents were initially high, but decreased during succeeding months. Accidents also increased significantly in Marin, rising 82% above pre-project levels during the first years of the project. After initial increases on Portland's Banfield Freeway and Miami I-95, accident rates have varied above and below pre-project averages, but the increases have not been so marked as those of the Santa Monica Freeway, South Dixie Highway,

EXHIBIT 10.1

AVERAGE MONTHLY VIOLATION RATE FOR PREFERENTIAL LANE PROJECTS



*Data trend; no month-to-month data available.

TABLE 10.2

SUMMARY OF INJURY AND TOTAL ACCIDENTS

PER MILLION VEHICLE-MILES

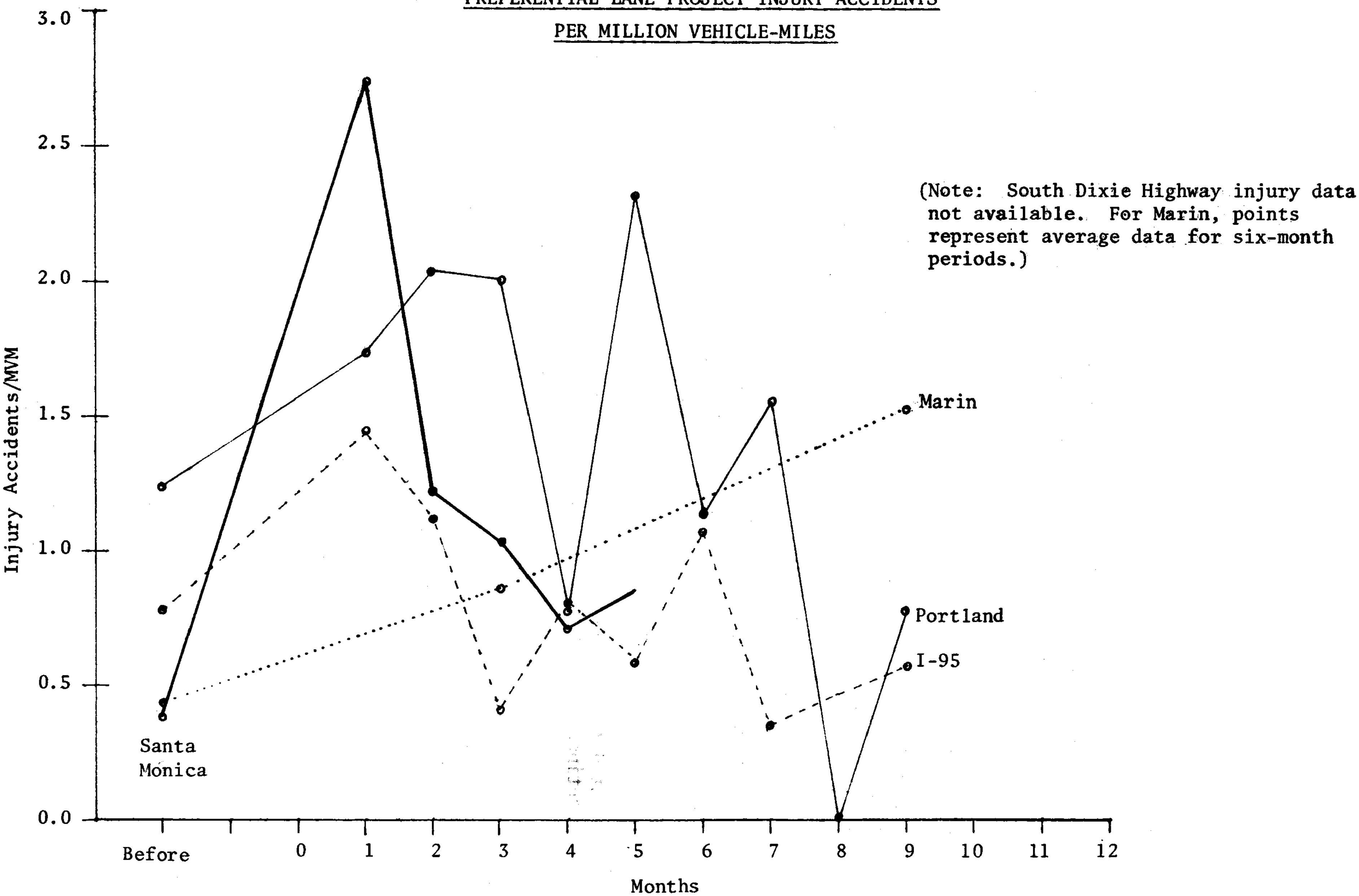
Project	Period Included in "After" Measurement (Months)	Injury and Fatal Accidents/MVM			Total Accidents/MVM		
		Before	After	% Increase (Decrease)	Before	After	% Increase (Decrease)
Miami I-95	9	0.78	.76	(-2.5%)	3.55	3.44	(-3.1%)
Miami South Dixie Highway	8	NA*	NA*	--	6.4	12.1	89%
Portland	9	1.24	1.37	10.5%	2.48	2.55	2.8%
Marin**	18	0.50	1.31	162%	2.33	4.23	82%
Santa Monica	4	0.40	1.16	190%	1.40	5.10	264%

*NA = data not available

**Accident data based on the average for three non-continous six-month periods.

EXHIBIT 10.2

PREFERENTIAL LANE PROJECT INJURY ACCIDENTS PER MILLION VEHICLE-MILES



and Marin projects. On Miami I-95, moreover, accident rates appear to have dropped slightly since project implementation. Both the Santa Monica Freeway and South Dixie Highway projects, the projects exhibiting the highest accident increases, have certain physical and operating characteristics which the other three projects lack: Both were created by removing a lane from existing traffic, and both have a median pullover area that permits enforcement of lane restrictions. Consequently, enforcement levels on both projects have been high and violation rates comparatively low.

Both the congestion caused by lane removal and the distracting effects of violators being ticketed in the median help to account for increased accident rates. In the Santa Monica Freeway project, however, it appeared that the high speed differential between the preferential lane and the congested adjacent lanes was an even more significant factor in explaining accident increases. Speed statistics by lane are available for only three of the projects surveyed. The approximate average speed differentials are 12 miles per hour on the Santa Monica Freeway, 11 miles per hour on the South Dixie Highway, and six miles per hour on Portland's Banfield Freeway.

10.4.2 Injury Accidents

Accidents which involve property damage only (PDO) are not counted uniformly in all states; in some states, all PDO accidents are counted, whereas in others only those above a set dollar amount are counted. For this reason, injury accidents per million vehicle-miles are perhaps a more accurate measure of safety. Injury accidents for the Miami I-95, Portland, Marin and Santa Monica Freeway Diamond Lane projects are shown in Exhibit 10.2. Total and injury accidents "before" and "after" are summarized in Table 10.2.

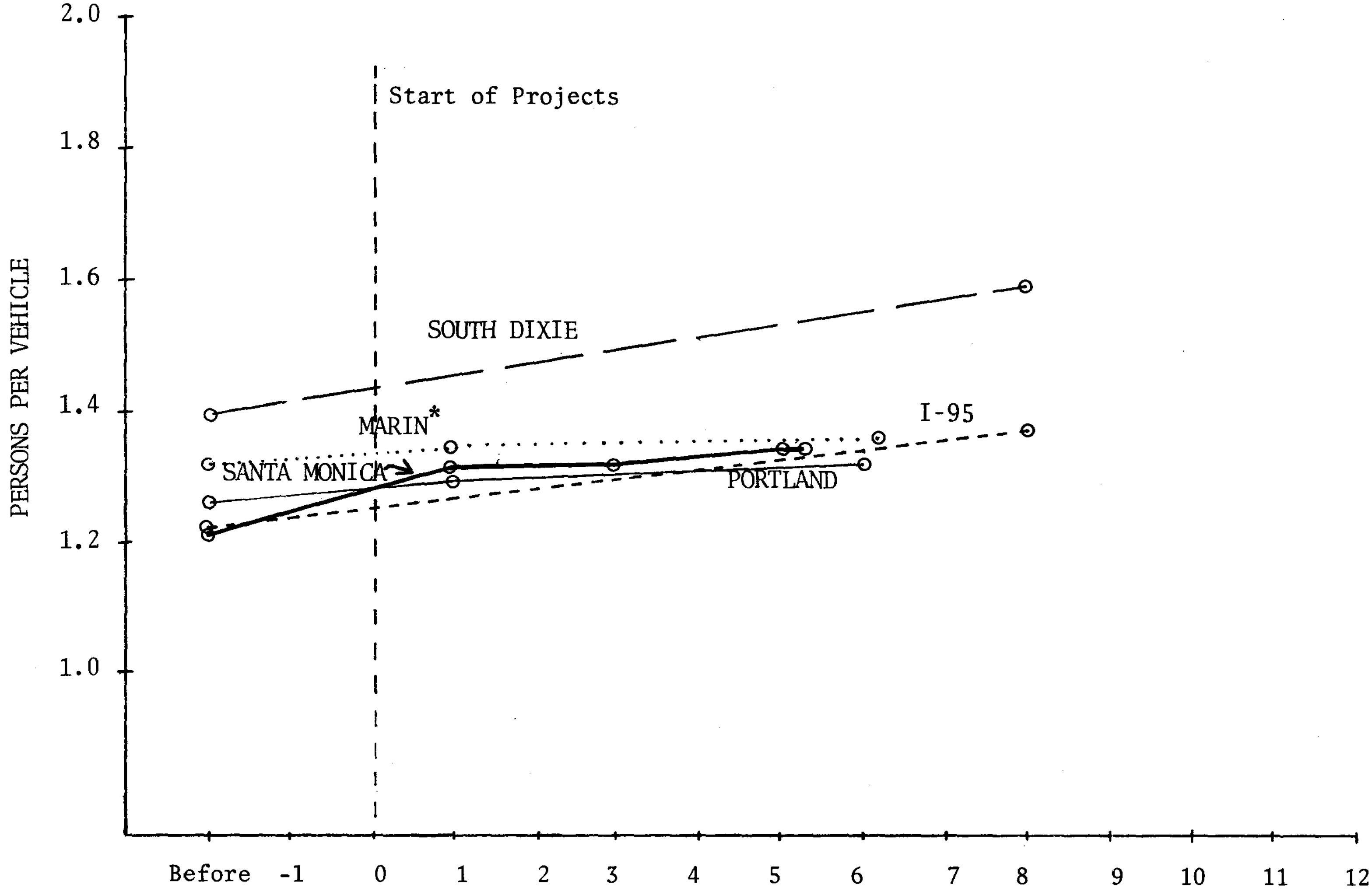
10.5 Bus Ridership

Increases in bus ridership among the projects selected for comparison varied widely depending upon the circumstances. In most cases, the increases were gradual and did not appear to level off during the first one-year period. Increased service and coverage, publicity, scheduling, reliability, suitable park-and-ride facilities, and the permanence of the operation are among the significant factors mentioned by project personnel in explaining ridership increases.

10.6 Carpools

As with bus ridership, increases in carpools among the projects also varied widely. In most cases, the growth was gradual over the initial six-month or one-year period. In some cases, however, exogenous events strongly influenced the growth pattern; e.g., a change from three-person to two-person carpools on the I-95 project, and the Golden Gate Transit Bus Strike, which significantly increased the number of carpools in a short period of time for the Marin County project. Bus and automobile occupancy rates are shown in Exhibit 10.3, which shows that the various projects have relatively similar occupancy patterns.

EXHIBIT 10.3 PREFERENTIAL LANE PROJECTS OCCUPANCY RATES
(Autos and Buses)



* Autos only

SECTION 6

APPENDICES

APPENDIX A

SURVEY MECHANICS AND SURVEY FORMS

1) Santa Monica Freeway Corridor User Survey
    a) Mechanics
    b) Sample Survey
2) On-Board Bus Survey
    a) Mechanics
    b) Sample Survey
3) Commuter Computer Evaluation Survey Sample

APPENDIX A-1: SANTA MONICA FREEWAY CORRIDOR USER SURVEY

Summary of Mechanics

Following the termination of the Diamond Lane project, the California Department of Transportation conducted a mail survey of drivers in the Santa Monica Freeway corridor. This survey was designed to collect information on travel patterns before, during and after the Diamond Lane project; demographic characteristics of the motorists using the corridor; and attitudes toward various aspects of the urban transportation problem in general and the Diamond Lane project in particular.

To take the survey, CALTRANS photographed 18,518 license plates in the corridor during peak hours on three days near the end of August.This was just after the SCRTD transit workers went on strike. Of these 18,518 photographs, 13,253 were taken on the Santa Monica Freeway at Western Avenue and the rest were taken on Olympic and Exposition Boulevards, which parallel the freeway. In addition, 837 license plates were photographed in the freeway Diamond Lanes during June. To obtain the mailing addresses corresponding to these license plates the numbers were fed into the CALTRANS computer, which printed the addresses on the survey questionnaires. A sample copy of the lengthy four-page survey is included in Appendix A. After eliminating duplicates, company registrations and leasing companies, 15,969 surveys were mailed in late October. 667 of these were declared "undeliverable" and returned by the post office. Drivers using the Santa Monica Freeway or city streets parallel to it were asked to complete the questionnaire and mail it to CALTRANS with no postage required. The response was not overwhelming, but 18% or 2,938 of the 15,302 surveys were returned. These surveys were then sent to SYSTAN for analysis.

After eliminating incomplete and facetious responses, 2,849 of the surveys were deemed valid and usable for the analysis. The surveys were coded by letter before mailing to indicate the location of the photograph. The source of the photographs are shown for both the initial mail sample and the usable sample. The "response rate" is also tabulated for each category.

	Initial Sample	Usable Sample	Response Rate
June carpools in the Diamond Lane	643 (4%)	119 (4%)	19%
Santa Monica Freeway at Western Avenue	10,446 (68%)	2,061 (72%)	20%
Parallel Streets Olympic and Exposition	4,213 (28%)	653	15%
Unknown	0 (10%)	16 (1%)	--
Total	15,302 (100%)	2,849 (100%)	19%

The first question to be answered before any conclusions are drawn from the survey is whether or not the sample is biased. The figures shown above indicate that the majority of the surveys were sent to Santa Monica Freeway drivers, and that the response rate was approximately the same for each category. The general characteristics and attitudes of the respondents support the hypothesis that the sample is representative of the population of peak period Santa Monica Freeway corridor automobile users.

SANTA MONICA FREEWAY CORRIDOR USER SURVEY

Dear Motorist:

The California Department of Transportation is gathering data so that SYSTAN, INCORPORATED of Los Altos, California, a private research organization, can complete an independent transportation survey in the westerly Los Angeles area.

If you or anyone in your household use the Santa Monica Freeway or streets parallel to it, it would be appreciated if the driver would answer the questions below. This would aid greatly in planning and evaluating future transportation projects in the Los Angeles area as well as elsewhere in California. Thank you for your cooperation.

THE CALIFORNIA DEPARTMENT OF TRANSPORTATION

1. What is the **main** purpose of your trip using the Santa Monica Freeway corridor?
   - ☐ Work (regular commuting)
   - ☐ School
   - ☐ Social,recreational
   - ☐ Business (work related)
   - ☐ Shopping
   - ☐ Other

2. How often is this trip made?
   - ☐ Once a **month** or less
   - ☐ 2-5 times a **month**
   - ☐ 2 or 3 times a **week**
   - ☐ 4 or 5 times a **week**

3. What time do you usually start your trip in the morning?__________a.m. In the afternoon? __________p.m.

4. Where does your trip usually **begin** in the morning?

   ____
   (Nearest major cross streets and city)

5. How do you usually make this trip?
   - ☐ Drive alone
   - ☐ Bus
   - ☐ Car pool with _____(no.) people (include driver)
   - ☐ Other ____________________

6. What major route do you usually use on your trip? (Check both A.M. and P.M. route)

A.M. Trip	MAJOR ROUTE	P.M. Trip
☐	Santa Monica Freeway	☐
☐	Olympic Boulevard	☐
☐	Pico Boulevard	☐
☐	Venice Boulevard	☐
☐	Washington Boulevard	☐
☐	Adams-Culver	☐
☐	Jefferson-National	☐
☐	Exposition-Rodeo	☐
☐	Other__________ Specify	☐

7. If you use the Santa Monica Freeway, please check the appropriate ramps or freeways you use to **enter and leave** the freeway. (Both A.M. and P.M. trip)

Morning Trip		ENTRANCE RAMP OR FREEWAY	Afternoon Trip	
Enter	Leave		Enter	Leave
☐	☐	Pacific Coast Highway	☐	☐
☐	☐	San Diego Freeway	☐	☐
☐	☐	__________ on-ramp	☐	☐
☐	☐	__________ on-ramp	☐	☐
☐	☐	__________ off-ramp	☐	☐
☐	☐	__________ off-ramp	☐	☐
☐	☐	Harbor Freeway	☐	☐
☐	☐	Santa Ana or Pomona Freeway	☐	☐
☐	☐	Golden State Freeway	☐	☐
☐		Don't Use Santa Monica Freeway	☐	

8. Where does your trip usually **end** in the morning?

   ____
   (Nearest major cross streets and city)

9. How long does your trip usually take in the morning?_________min. Your return trip in the afternoon?__________min.

10. How long is your one-way trip? ________ miles

11. How much does it cost to park your vehicle at the end of your trip?

☐ Free ☐ $_______per day ☐ $_______per month

12. Is there a public bus service that you could use to make your usual trip?

☐ Yes ☐ No ☐ Don't know

IF YOU USUALLY DRIVE ALONE, PLEASE ANSWER THE FOLLOWING QUESTIONS. IF THERE ARE USUALLY TWO OR MORE PERSONS IN YOUR VEHICLE, SKIP TO QUESTION 16.

13. Have you ever been a member of a car pool? ☐ Yes ☐ No

14. The major reason I do not car pool now is:

☐ Don't like to car pool
☐ Can't find riders with my hours
☐ Need my car during the day
☐ Can't find riders with my destination
☐ My car is too small
☐ Other ______________________
Explain

15. Have you ever contacted **"Commuter Computer"** for a car pool match? ☐ Yes ☐ No

If yes, when?__________ Mo./Yr. How many names did you receive? __________
No.

SKIP TO QUESTION 23

IF THERE ARE USUALLY TWO OR MORE PERSONS IN YOUR VEHICLE, PLEASE ANSWER THE FOLLOWING QUESTIONS:

16. When did you begin car pooling regularly? __________________
Month/Year

17. How was this car pool formed?

☐ Among co-workers
☐ Commuter Computer
☐ Other
☐ Among friends or neighbors
☐ Company car pool program
☐ Members of my family

18. What was the **primary** incentive to form this car pool?

☐ Cost savings
☐ Preferential on-ramp lanes
☐ Santa Monica Freeway Diamond Lanes
☐ Other, explain ______________________
☐ Employer program
☐ Dislike driving
☐ Save Energy and reduce pollution

19. How did the riders in this car pool make the trip before the car pool was formed?

☐ Bus______ No. ☐ Drove alone________ No. ☐ Another car pool ________ No. ☐ Didn't make trip ________ No.

☐ Other (please specify) ______________________

20. How many separate cars are driven each morning at the beginning of the trip?

☐ One, the driver picks up all members
☐ _______Cars are driven and we meet at common pick-up point (include car pool car)
No.

21. Of the cars left at home because of this car pool, what is the total number of miles they are driven daily while the car pool members are away from home?

Total number of cars at home because of **this** car pool. __________________
Number of **these** cars driven during day. __________________
Total daily miles driven by these cars.__________________
No.

22. Which of the following attitudes best express your opinion about car pooling:

☐ I am generally satisfied as a long-term means of commuting.
☐ I am generally satisfied but feel that a good mass transit system would provide a better means of future commuting.
☐ I am generally satisfied but feel more should be done to provide preferential lanes for car pools.
☐ I am dissatisfied with car pooling. Why? ______________________

TO BE ANSWERED BY ALL DRIVERS

23. Before the "Diamond Lanes" were implemented (March 15) bypass lanes for car pools with 2 or more persons were installed on many of the on-ramps to the Santa Monica Freeway. Did these ramps cause you to;

- ☐ Change route to **use** bypass ramp
- ☐ Change route to **avoid** bypass ramp
- ☐ Join or form a car pool
- ☐ Didn't make a change

24. During the operation of the "Diamond Lane" on the Santa Monica Freeway (March 15th to August 13th), which of the following conditions of your usual trip **changed?**
(Please check both **which conditions** changed and **how it** changed.)

CONDITION THAT CHANGED	A.M. TRIP	P.M. TRIP
☐ Usually left home at different time	_______ min. ☐ earlier ☐ later	_______ min. ☐ earlier ☐ later
☐ Total time to make trip changed	_______ min. ☐ longer ☐ shorter	_______ min. ☐ longer ☐ shorter
☐ Length of trip changed	_______ mi. ☐ longer ☐ shorter	_______ mi. ☐ longer ☐ shorter
☐ Changed **from freeway** to city street	which one?_______	which one?_______
☐ Changed **from city streets** to freeway	☐ Yes ☐ No	☐ Yes ☐ No
☐ Used another freeway	which one?_______	which one?_______
☐ Entered Santa Monica Freeway at different location	where?_______	where?_______
☐ Used Diamond Lane	☐ Yes ☐ No	☐ Yes ☐ No
☐ Used ramp bypass lanes	which one?_______	which one?_______
☐ Used bus	☐ Still use bus ☐ Stopped because of strike ☐ Stopped at end of "Diamond Lane"	
☐ Formed car pool	☐ Still in car pool ☐ Stopped car pooling at end of "Diamond Lane"	
☐ Increased size of car pool	From_______persons before to_______persons during "Diamond Lane"	
☐ Didn't make trip	Why?	
☐ No change		
☐ Other_______ (Explain		

25. If you did not make a **change** during the Diamond Lane Operation, did you **try** any of the following? I tried:

- ☐ Using the bus but didn't like it
- ☐ To form a car pool but couldn't
- ☐ Riding in car pool, but it didn't work out
- ☐ Different entrances to Santa Monica Freeway
- ☐ Alternate City Streets
- ☐ Different departure times
- ☐ Using another freeway
- ☐ Other_______
(Explanation)

26. Do you feel the problem of non-car poolers **violating** the "Diamond Lane" rule was:

☐ Serious ☐ Minor ☐ No Problem ☐ Other _______

27. **If you used the Diamond Lane,** did you experience any of the following difficulties:

- ☐ Difficulty entering the lane
- ☐ Difficulty leaving the lane for freeway exit
- ☐ Dislike of following bus in lane
- ☐ Uncomfortable going faster than next lane
- ☐ Other, specify_______
- ☐ Experienced no difficulties using lane

28. How would you rate the following programs?

	Greatly Beneficial	Beneficial	Of No Benefit	Harmful
Santa Monica Freeway "Diamond Lanes"	☐	☐	☐	☐
On-ramp bypass lanes (2 or more)	☐	☐	☐	☐
Ramp metering	☐	☐	☐	☐
Express bus service	☐	☐	☐	☐

29. How do you rate the transportation problems listed below?

Air Pollution
☐ Serious
☐ Minor
☐ No Problem

Future Gas Shortage
☐ Serious
☐ Minor
☐ No Problem

Freeway Congestion
☐ Serious
☐ Minor
☐ No Problem

30. How many cars are there in your household? ______ No. Licensed drivers? ______ No.

31. What type of car do you drive to work?

☐ Standard ☐ Compact ☐ Subcompact ☐ Luxury ☐ Van
☐ Sports car ☐ Station wagon ☐ Other

PLEASE CHECK

32. Sex: ☐ Female ☐ Male

33. Age Group: ☐ Under 18 ☐ 18-29 ☐ 30-44 ☐ 45-64 ☐ 65 and over

34. What is the combined yearly income of your household?

☐ Under $5,000
☐ $5,000 to $9,999
☐ $10,000 to $14,999
☐ $15,000 to $19,999
☐ $20,000 to $29,999
☐ $30,000 and over

We would appreciate your additional comments:

____
____
____
____
____
____

Thank you for your cooperation. Please fold, staple and mail (no stamp required)

L.A. 900 NOV 26 AM TERMINAL

FIRST CLASS
PERMIT No. 41955
Los Angeles, Calif.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

Postage will be paid by —

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

FREEWAY OPERATION BRANCH

DISTRICT 7

BOX 2304, TERMINAL ANNEX

LOS ANGELES, CALIFORNIA 90051

APPENDIX A-2 ON-BOARD BUS SURVEYS

Two on-board bus surveys of rider attitudes and behavior were conducted during the Diamond Lane project. The SCRTD survey was taken on Wednesday, June 30, 1976 during the 16th week of operation. The SMMBL survey was conducted on Thursday, August 12, 1976 during the 22nd week but before the project terminated on August 13 by court order.

The survey forms (see Exhibits) were essentially the same for SCRTD and SMMBL except for changes to three questions: 18, 9 and 6A - two of which reflected SMMBL's marketing program and their fare structure and one, a question inadvertently left off the SCRTD form. The SCRTD survey was also printed in Spanish.

Table A.1 shows the ridership sampled by line, compared to estimated ridership by line for that survey day.

Table A.1

SAMPLE SIZE TO TOTAL RIDERSHIP
(By Line)

	No. of Riders Surveyed	% of Total	Estimated Total Ridership (◊ Lane Hrs.)	% of Total	Percentage Surveyed
SCRTD					
A.M. Runs					
601	61	4.2	95	3.3	64.2
602	161	11.1	335	11.6	48.1
603	26	1.8	66	2.3	39.4
607	215	14.8	433	15.0	49.7
608	74	5.1	140	4.9	52.9
708	120	8.3	222	7.7	54.1
P.M. Runs					
604	177	12.2	787	27.3	22.5
605	99	6.8	326	11.3	30.4
606	90	6.2	284	9.8	31.7
746	81	5.6	196	6.8	41.3
	1,104	100.0	2,884	100.0	
SMMBL					
A.M. Runs					
10	348		998		35.0

[1] Passenger counts taken on the two days immediately before and after the survey date; thus, patronage was estimated by averaging the two days.

RTD

№ 2199

| A | M | E | | | | | | | | | | | | | | | | | | | | | AM

Santa Monica Freeway Bus Survey

This survey is being conducted to gain an understanding of your transit needs and how well the present bus service responds to these needs. The following questions concern the trip you are now making. All information will be kept confidential. Please return completed forms to survey taker.

1. **How did you get to this Bus?**
   ( ) walked (No. of blocks ______)
   ( ) drove
   ( ) was driven
   ( ) other, specify ______________
   ( ) walked _____ blocks to board bus Line No. _____ to travel to this bus

2. **Where did you board this bus?**
   ( ) bus stop at ______________ (nearest cross-streets)
   ( ) Fox Hills Park/Ride lot
   ( ) Santa Monica Park/Ride lot.

3. **From where did you start your trip to the above lot or bus stop?**
   ( ) home, location ______________ (nearest cross-streets)
   ( ) other, location ______________ (nearest cross-streets)

4. **What time did you leave your home or other origin to start this trip?**
   _______ a.m.

5. **What is the main purpose of the bus trip you are now making?**
   ( ) work
   ( ) social - recreational
   ( ) school
   ( ) medical - dental
   ( ) shopping
   ( ) other, specify ______________

6. **Where will you get off this bus?**
   Bus stop at ______________ (nearest cross-streets)

7. **How will you get to your destination after leaving this bus?**
   ( ) walk (No. of blocks _____)
   ( ) transfer to another bus (Line No. _____) and then walk (_____ blocks)
   ( ) other, specify ______________

8. **What is the address of your destination:**
   ______________ (or nearest cross-streets)

9. **How did you pay the driver when you boarded this bus?**
   ( ) cash $ ______________ (total cost including transfers)
   ( ) monthly pass $______________ (pass cost per month)

10. **How often you do you ride this bus line each week?**
    ( ) regularly
    ( ) 3 to 4 days
    ( ) 1 to 2 days
    ( ) very seldom

11. **When did you start using this bus line?**
    ( ) before the Diamond Lane started
    ( ) May 1976
    ( ) March 15 - March 31
    ( ) June 1976
    ( ) April 1976.

12. **How do you normally return home from downtown Los Angeles?**
    ( ) on this bus route
    ( ) carpool (No. of persons _____)
    ( ) on another bus route (Route No. _____)
    ( ) other, specify ______________

13. **How did you make this trip before the Diamond Lane was operating?**
    ( ) drove my car alone
    ( ) did not make the trip
    ( ) was in a carpool (No. of persons _____)
    ( ) rode the bus (Route No. _____)
    ( ) other, specify ______________

14. **If you used a car to make this trip before the Diamond Lane went into operation, was there a parking fee?**
    ( ) Yes ( ) No
    If yes, how much did you pay $_____ day or $_____ month

OVER

15. **How long did this trip take you before the Diamond Lane went into operation?**

_______ minutes

16. **Do you feel the problem of non-carpoolers violating the Diamond Lane rule is:**

( ) serious ( ) no problem
( ) minor ( ) other, specify ____________

17. **Do you feel that on-ramp by-pass lanes for buses and carpools are:**

( ) greatly beneficial ( ) of no benefit
( ) beneficial ( ) a detriment

18. **How did you first gain the information necessary to use this particular bus line?**

( ) newspaper story ( ) sent in newspaper coupon
( ) newspaper advertisement ( ) from friend or co-worker
( ) called RTD for information ( ) information distributed at freeway on-ramps
( ) RTD downtown information displays ( ) other, specify ____________

19. **Which of the following statements best expresses your opinion of the Diamond Lane Bus Service:**

( ) very satisfied ( ) Not too satisfied
( ) somewhat satisfied ( ) dissatisfied

Please explain ____

____

20. **If you changed from driving to taking the bus, did you change because of:**

( ) freeway congestion ( ) allows someone to use car
( ) gives me time to relax ( ) carpool broke up
( ) saves time ( ) save energy and reduce pollution
( ) dislike driving ( ) other, specify ____________

21. **What are your regular working hours?**

_______ a.m. to _______ (a.m.) (p.m.) ( ) I have no regular working hours

22. **How many cars do you have in your household?**

( ) no car ( ) 2 cars
( ) 1 car ( ) 3 or more cars

23. **Was a car available to you for this trip?**

( ) No (bus only practical means) ( ) Yes, but I prefer to take the bus
( ) Yes, but with considerable inconvenience to others

24. **Are you a licensed driver?**

( ) Yes ( ) No

25. **Sex**

( ) female ( ) male

26. **Age group:**

( ) under 18 ( ) 45 - 64
( ) 18 - 29 ( ) 65 and over
( ) 30 - 44

27. **Households combined yearly income:**

( ) under $5,000 ( ) $15,000 - $19,999
( ) $5,000 - $9,999 ( ) $20,000 - $29,999
( ) $10,000 - $14,999 ( ) over $30,000

28. **What is your occupation?**____

Any other comments or suggestions for service improvement:

____

____

____

№ 4344

| P | M | E | | | | | | | | | | | | | | | | | | | | | | PM

Santa Monica Freeway Bus Survey

This survey is being conducted to gain an understanding of your transit needs and how well the present bus service responds to these needs. The following questions concern the trip you are now making. All information will be kept confidential. Please return completed forms to survey taker.

1. **For what purpose were you in downtown Los Angeles today?**
   ( ) work ( ) social - recreational
   ( ) school ( ) medical - dental
   ( ) shopping ( ) other, specify ____________ ____________
   Location of work place or other origin of trip: ____________ (nearest cross-streets)
   What time did you leave the above address for your trip to the bus stop? ________ p.m.

2. **How did you get to the bus stop in downtown Los Angeles to board this bus?**
   ( ) walk (No. of blocks _____) ( ) other specify ____________
   ( ) walked _____ blocks then boarded Bus Line No. _____ to travel to this bus stop

3. **Where did you *board* this bus?**
   Bus stop at ____________ (nearest cross-streets)

4. **What is the location where you will *get off* this bus?**
   ( ) bus stop at ____________ (nearest cross-streets) ( ) Fox Hills Park/Ride Lot
   ( ) Santa Monica Park/Ride Lot

5. **How will you get to your final destination when you get off this bus?**
   ( ) walk (No. of blocks _____) ( ) drive my car
   ( ) will be picked up by another person ( ) other, specify ____________
   ( ) transfer to another bus (Line No. _____) and then walk (_____ blocks)

6. **What is the final destination of your trip?**
   ( ) home, location: ____________ (nearest cross-streets)
   ( ) other, location: ____________ (nearest cross-streets)

7. **How did you pay the driver when you boarded this bus?**
   ( ) cash $ ____________ (total cost including transfer) ( ) monthly pass $ ____________ (pass cost per month)

8. **How often do you ride this bus line each week?**
   ( ) regularly ( ) 3 to 4 days
   ( ) 1 to 2 days ( ) very seldom

9. **When did you start using the bus line?**
   ( ) before the Diamond Lane started ( ) May 1976
   ( ) March 15 - 31 ( ) June 1976
   ( ) April 1976

10. **How do you normally travel to downtown Los Angeles?**
    ( ) on this bus route ( ) carpool (No. of persons _____)
    ( ) on another bus route (route No. _____) ( ) other, specify ____________

11. **How did you make this trip before the Diamond Lane was operating?**
    ( ) drove my car alone ( ) rode the bus (Route No. _____)
    ( ) was in a carpool (No. of persons _____) ( ) did not make the trip
    ( ) other, specify ____________

12. **If you used a car to make this trip before the Diamond Lane went into operation, was there a parking fee?**
    ( ) Yes ( ) No
    If yes, how much did you pay $_____ day or $_____ month

13. **How long did this trip take you before the Diamond Lane went into operation?**
    ________ minutes

OVER

14. **Do you feel the problem of non-carpoolers violating the Diamond Lane rule is:**

( ) serious ( ) no problem

( ) minor ( ) other, specify ______________

15. **Do you feel that on-ramp by-pass lanes for buses and carpools are:**

( ) greatly beneficial ( ) of no benefit

( ) beneficial ( ) a detriment

16. **How did you first gain the information necessary to use this particular bus line?**

( ) newspaper story ( ) sent in newspaper coupon

( ) newspaper advertisement ( ) from friend or co-worker

( ) called RTD for information ( ) information distribution at freeway on-ramps

( ) RTD downtown information displays ( ) other, specify ______________

17. **Which of the following statements best expresses your opinion of the Diamond Lane bus service?**

( ) very satisfied ( ) not too satisfied

( ) somewhat satisfied ( ) dissatisfied

Please explain ______________

____

18. **If you changed from driving to taking the bus, did you change because of:**

( ) freeway congestion ( ) allows someone to use car

( ) gives me time to relax ( ) carpool broke up

( ) saves time ( ) save energy and reduce pollution

( ) costs less ( ) other, specify ______________

( ) dislike driving

19. **What are your regular working hours?**

_______ am. to _______ (a.m.) (p.m.) ( ) have no regular working hours

20. **How many cars do you have in your household?**

( ) no car ( ) 2 cars

( ) 1 car ( ) 3 or more cars

21. **Was a car available to you for the trip downtown?**

( ) No (bus only practical means) ( ) Yes, but I prefer to take the bus

( ) Yes, but with considerable inconvenience to others

22. **Are you a licensed driver?**

( ) Yes ( ) No

23. **Sex**

( ) female ( ) male

24. **Age group:**

( ) under 18 ( ) 45 - 64

( ) 18 - 29 ( ) 65 and over

( ) 30 - 44

25. **Household's combined yearly income?**

( ) under $5,000 ( ) $15,000 - $19,999

( ) $5,000 - $9,999 ( ) $20,000 - $29,999

( ) $10,000 - $14,999 ( ) over $30,000

26. **What is your occupation?** ______________

Any other comments or suggestions for service improvement:

____

____

____

RTD

Nº 1283

| A | M | S | | | | | | | | | | | | | | | | | | | | | | AM

Censo Sobre Servicio En Autopista De Santa Monica

Este cuestionario es parte de una investigación para determinar los problemas de transportación de nuestros pasajeros, y como nuestro servicio ayuda al cliente. Las siguientes preguntas confidenciales son sobre el viaje actual. Al terminarlo, por favor devuelvaselo al agente que ayuda a conducir la investigación.

1. **¿Como llegó Ud. a este autobus?**
   ( ) Caminé (Numero de cuadras ______) ( ) Conducí auto
   ( ) Me trajeron en auto
   ( ) Otra forma de transportación; especifique ______
   ( ) Caminé ______ cuadras para abordar Linea # ______, que me trajo a esta linea.
2. **¿Donde subió a este autobus?**
   ( ) Parada de ______ ( ) Estacionamiento de Fox Hills Park 'n' Ride
   ( ) Estacionamiento de Santa Monica Park 'n' Ride
3. **¿Desde donde comenzó su viaje a dicha parada o punto de estacionamiento?**
   ( ) su hogar ______ (o cruce de calles mas cercanas a su direccion)
   ( ) otro sitio particular ______ localidad ______ (cruce mas cercano a esta)
4. **¿A qué hora salió de su hogar o punto de origen de éste viaje?**
   ______ a.m.
5. **¿Cual es el proposito principal de este viaje en particular?**
   ( ) al trabajo ( ) recreación social
   ( ) a la escuela ( ) visita al doctor o dentista
   ( ) de compras ( ) otra razón (favor estipular) ______
6. **¿Donde se baja del autobus?**
   parada en ______ (cruce de calles mas cercano)
7. **¿Como llegará a su destino despues de apearse?**
   ( ) Caminando (numero de cuadras ______)
   ( ) Transbordo a otro autobus (Linea # ______) y entonces camino ______ cuadras
   ( ) Otro modo (favor estipular ______)
8. **¿Cual es la dirección donde se dirige Ud.?**
   ______ (o cruce de calles mas cercano)
9. **¿Cómo le pagó Ud. al chofer del autobus al subir abordo?**
   ( ) efectivo, cantidad: ______ (precio de transbordo inclusive) ( ) Pase Mensual; precio al mes ______
10. **¿Cuanto usa Ud. esta linea por semana?**
    ( ) Regularmente ( ) 3 a 4 dias
    ( ) 1 o 2 dias ( ) muy pocas veces
11. **¿Cuando comenzó Ud. a usar esta linea?**
    ( ) Antes que se inició el Diamond Lane (antes del 15 de marzo, de 1976)
    ( ) Desde 15 a 31 de marzo, de 1976 ( ) Mayo, 1976
    ( ) Abril, 1976 ( ) Junio, 1976
12. **Ordinariamente, ¿cómo vuelve Ud. del centro de Los Angeles a su casa?**
    ( ) por esta ruta de autobus ( ) por auto con otras personas (numero de personas ______)
    ( ) por otra ruta (autobus # ______)
    ( ) otro modo, (especifique ______)
13. **Antes de que el Diamond Lane se inició, ¿como hacía Ud. este viaje?**
    ( ) Conducía mi auto solo ( ) No efectuaba el viaje
    ( ) En un auto con varias personas (num. de personas ______) ( ) Por linea de autobuses # ______
    ( ) Otro modo (por favor especifique ______)
14. **Si usaba automovil para hecer el viaje antes que se inició el Diamond Lane, ¿pagaba Ud. por estacionar su auto?**
    ( ) Si ( ) No
    Si su respuesta es afirmativa, cuanto pagaba por semana ______ o por mes ______.

15. **¿Cuanto tiempo le tomaba el viaje antes que se inició la operacion del Diamond Lane?**

_______ minutos

16. **¿Diriá Ud. que el problema de violacion de las reglas del Diamond Lane por los que no llevan otros en sus autos es una infracción:**

( ) seria ( ) no es problema

( ) menor ( ) otra (especifique ______________________________)

17. **¿Diriá Ud. que los carriles de entrada especial a la autopista para los autobuses y "carpools", o vehiculos privados con varias personas, son carriles que brindan:**

( ) gran beneficio ( ) de ningun beneficio

( ) algún beneficio ( ) un impedimento

18. **Como llegó Ud. a saber la información pertinente sobre esta linea de autobus?**

( ) información en un periodico

( ) envié cupón de periodico

( ) llamé al RTD información

( ) rótulos informativos de RTD en el centro commercial

( ) anuncio en un periodico

( ) de un amigo o compañero de trabajo

( ) información distribuida en entrada a la autopista

( ) otro medio (por favor estipular______________________)

19. **¿Cual de los siguientes expresan su opinion sobre el servicio del Diamond Lane?**

( ) estoy muy satisfecho con el servicio

( ) bastante satisfecho

( ) no muy satisfecho con este servicio

( ) decepcionado

favor de comentar ____

____

20. **¿Si dejó de conducir para tomar el autobus, cambió Ud. por:**

( ) la congestión en la autopista

( ) me da tiempo a descansar

( ) me ahorra

( ) no me gusta conducir

( ) porque esto permite que otra persona use automovil

( ) grupo cooperativo de automovil se suspendió

( ) ahorrar energia y reducir contaminación al ambiente

( ) otra razón (particulares: ______________________)

21. **¿Cuales son sus horas normales de trabajo?**

_______ a.m. a _______ p.m. ( ) no tengo horas regulares de trabajo

22. **Cuantos automoviles tiene Ud. en su hogar?**

( ) ninguno ( ) 2 autos

( ) uno ( ) 3 o mas

23. **Habiá un automovil disponible para este viaje?**

( ) No (el autobus es mi único medio practico) ( ) Si, pero prefiero tomar el autobus

( ) Si, pero con bastante inconveniencia para otros

24. **Tiene Ud. licencia para conducir automovil?**

( ) Si ( ) No

25. **Sexo:**

( ) Mujer ( ) Hombre

26. **Edad:**

( ) Menos de 18 ( ) 45 - 64

( ) 18 - 29 ( ) 65 o más

( ) 30 - 44

27. **Total de ingresos en su hogar al año:**

( ) Meno de $5,000 ( ) $15,000 - $19,999

( ) $5,000 - $9,999 ( ) $20,000 - $29,999

( ) $10,000 - $14,999 ( ) mas de $30,000

28. **Cual es su ocupación?** ____

Cualquier otro comentario o sugerencia para mejora de servicio:

____

Santa Monica Freeway Bus Survey

Dear Blue Diamond Express Patron:
As a participant in one of the most innovative transportation projects in the United States, the federal Urban Mass Transportation Administration has asked us to obtain your responses to the following questions. When you are finished, please give this form to the driver or leave it on your seat.

1. How did you get to this Bus?

( ) walked (No. of blocks ______) ( ) drove
( ) was driven ( ) other, specify ______
( ) walked ______ blocks to board bus Line No. ______ to travel to this bus

2. Where did you board this bus?

( ) bus stop at ______ (nearest cross streets)

3. From where did you start your trip to the above lot or bus stop?

( ) home, location ______ (nearest cross streets)
( ) other, location ______ (nearest cross streets)

4. What time did you leave your home or other origin to start this trip?

______ a.m.

5. What is the main purpose of the bus trip you are now making?

( ) work ( ) social - recreational
( ) school ( ) medical - dental
( ) shopping ( ) other, specify ______

6. Where will you get off this bus?

Bus stop at ______ (nearest cross streets)

6A. What time will you arrive at your destination?

______ AM PM

7. How will you get to your destination after leaving this bus?

( ) walk (No. of blocks ______)
( ) transfer to another bus (Line No. ______) and then walk (______ blocks)
( ) other, specify ______

8. What is the address of your destination:

______ (or nearest cross streets)

9. How did you pay the driver when you boarded this bus?

( ) regular cash fare ( ) transfer, plus zone fare ( ) student discount card
( ) tokens ( ) senior citizens fare ( ) handicapped fare

10. How often you do you ride this bus line each week?

( ) regularly ( ) 3 to 4 days
( ) 1 to 2 days ( ) very seldom

11. When did you start using this bus line?

( ) March 15 - March 31 ( ) May 1976
( ) April 1976. ( ) June 1976

12. How do you normally return home from downtown Los Angeles?

( ) on this bus route ( ) carpool (No. of persons ______)
( ) on another bus route (Route No. ______) ( ) other, specify ______

13. How did you make this trip before the Diamond Lane was operating?

( ) drove my car alone ( ) did not make the trip
( ) was in a carpool (No. of persons ______) ( ) rode the bus (Route No. ______)
( ) other, specify ______

14. If you used a car to make this trip before the Diamond Lane went into operation, was there a parking fee?

( ) Yes ( ) No

If yes, how much did you pay $______ day or $______ month

(OVER)

15. **How long did this trip take you before the Diamond Lane went into operation?**

_______ minutes

16. **Do you feel the problem of non-carpoolers violating the Diamond Lane rule is:**

( ) serious ( ) no problem

( ) minor ( ) other, specify _______________

17. **Do you feel that on-ramp by-pass lanes for buses and carpools are:**

( ) greatly beneficial ( ) of no benefit

( ) beneficial ( ) a detriment

18. **How did you first gain the information necessary to use this particular bus line?**

( ) newspaper story
( ) newspaper advertisement
( ) called Blue Bus information
( ) information displays in downtown L.A.
( ) from friend or co-worker
( ) information distributed at freeway on-ramps
( ) information on other buses
( ) other, specify _______________

19. **Which of the following statements best expresses your opinion of the Diamond Lane Bus Service:**

( ) very satisfied ( ) Not too satisfied

( ) somewhat satisfied ( ) dissatisfied

Please explain _______________

____

20. **If you changed from driving to taking the bus, did you change because of:**

( ) freeway congestion ( ) allows someone to use car

( ) gives me time to relax ( ) carpool broke up

( ) saves time ( ) save energy and reduce pollution

( ) dislike driving ( ) other, specify _______________

21. **What are your regular working hours?**

_______ a.m. to _______ (a.m.) (p.m.) ( ) I have no regular working hours

22. **How many cars do you have in your household?**

( ) no car ( ) 2 cars

( ) 1 car ( ) 3 or more cars

23. **Was a car available to you for this trip?**

( ) No (bus only practical means) ( ) Yes, but I prefer to take the bus

( ) Yes, but with considerable inconvenience to others

24. **Are you a licensed driver?**

( ) Yes ( ) No

25. **Sex**

( ) female ( ) male

26. **Age group:**

( ) under 18 ( ) 45 - 64

( ) 18 - 29 ( ) 65 and over

( ) 30 - 44

27. **Households combined yearly income:**

( ) under $5,000 ( ) $15,000 - $19,999

( ) $5,000 - $9,999 ( ) $20,000 - $29,999

( ) $10,000 - $14,999 ( ) over $30,000

28. **What is your occupation?**_______________

Any other comments or suggestions for service improvement:

____

____

____

We appreciate your taking the time to complete this questionnaire and your continued good patronage of the Blue Diamond Express.

APPENDIX A-3
COMMUTER COMPUTER EVALUATION SURVEY

JUNE 1976

HG ______________

WG ______________

EID ______________

COUNTY Los Angeles

No. times called: ☐ 1 ☐ 2 ☐ 3
(Check one)

Not interviewed because:
☐ No longer employed there
☐ Not interested/not cooperative
☐ Wrong or disconnected number
☐ Sick or on vacation
☐ Other ______________

Name ______________________

Normal Work Hours: BEGIN WORK ☐☐ HOUR ☐☐ MINUTES A.M. ☐ P.M. ☐ CHECK ONE; LEAVE WORK ☐☐ HOUR ☐☐ MINUTES A.M. ☐ P.M. ☐ CHECK ONE

Phone ( ) ______________ (Bates No. ______________)

"Hello. I'm ________ from Commuter Computer. Sometime ago you filled out a carpool application and we'd like to know if our program was helpful in placing you in a carpool. Would you be willing to answer a few questions for our transportation survey?"

If it is not convenient for the applicant at the time, say, "I'll call back later. What time will be more convenient?"

Name recognition: ☐ Yes ☐ No (Check one)

1) How do you usually travel to work? (Check one)

☐ Auto, drive alone ☐ Auto, carpool

☐ Bus ☐ Motorcycle

☐ Walk, bicycle, other ______________________ (please specify)

2) Approximately what is the distance from home to work <u>one way</u>? (Check one)

☐ Less than 5 miles ☐ 20-24 miles

☐ 5-9 miles ☐ 25-29 miles

☐ 10-14 miles ☐ 30 or more ______________ (How many more?)

☐ 15-19 miles

3) What was your major reason for wanting to join a carpool? (Check one)

☐ Save money ☐ Save wear & tear on car ☐ Special lanes, parking

☐ No car available ☐ More relaxing ☐ Pressure from employer

☐ Other ______________ (Please specify)

4) Did you join, form or expand a carpool because of a carpool list provided by Commuter Computer? (Check one)

☐ YES ☐ NO

If YES:

Are you still carpooling? (Check one)

☐ Yes ☐ No

If Yes — How long have you been carpooling?

__ Days
__ Weeks
__ Months
__ Years

If No — Why did you stop carpooling? __________

How long were you in a carpool?

__ Days
__ Weeks
__ Months
__ Years

THEN GO TO # 5

If NO:

Why not? (Check one)

☐ No real interest

☐ No matches on list

☐ People lived too far away

☐ Work hours off

☐ Outdated information

☐ Never used list

☐ Other __________

THEN GO TO # 10

5) Since joining a carpool, has your mileage per week to and from work decreased or increased? (Check one)

☐ Decreased ☐ Increased

By how many miles? __________

6) Is your car driven by other members of your household when it is not used in your carpool? (Check one)

☐ Yes ☐ No

If yes, approximately how many miles is it driven per day? __________

7) How many persons are in your carpool (including the driver? __________

8) How did you commute prior to joining a carpool? (Check one)

☐ Drive alone

☐ Motorcycle

☐ Bus

☐ Other __________ (Please specify)

☐ Another carpool

How many members were usually in this carpool? __________

9) As a member of a carpool, how frequently do you drive? (Check one)

☐ All the time ☐ Alternate, with _____ other drivers

☐ Ride only ☐ Other ______________________ (Please specify)

10) Do you remember how you first heard about Commuter Computer? (Check one)

☐ Employer
☐ Radio
☐ T.V.
☐ Newspaper
☐ Magazine
☐ Freeway signs
☐ Hand-outs (fliers)
☐ Friend or relative
☐ Billboard
☐ Poster
☐ Other ______________________ (Please specify)

11) How many vehicles are owned by members of your household? __________

12) How many licensed drivers are in your household? __________

13) What kind of a car do you drive to work? (Check one)

☐ Full size (Matador, Cutlass, LTD, Caprice)
☐ Compact (Nova, Dart, Maverick, Pacer)
☐ Sub-Compact (Pinto, Datsun, Vega, VW, Colt)
☐ Sports Car

If unsure: __________ Year of Car __________ Manufacturer __________ Make/Model

14) What can be done to improve the program in your opinion? Other comments.

____

____

____

15) Do you want to remain in the carpooling system? (Check one)

☐ YES ☐ NO

We'd like to insure that your application is still correct. Since you applied with us, has any change occurred in your transit information? (Check one)

☐ Yes ☐ No

If yes, what? ______________

____

____

Would you like to receive a new carpool list? Check one: ☐ Yes ☐ No

Why not? ______________________

____

____

THANK YOU VERY MUCH FOR YOUR COOPERATION!

APPENDIX B

SAMPLE DATA

1) Speed Run Sheets (2)
2) Occupancy Count Sheet
3) Volume Count Sheets (2)
4) Meter Observations
5) Bus Ridership Count Sheet

Appendix B (1)

FREEWAY OPERATION DEPARTMENT - TACHOGRAPH RECORDING

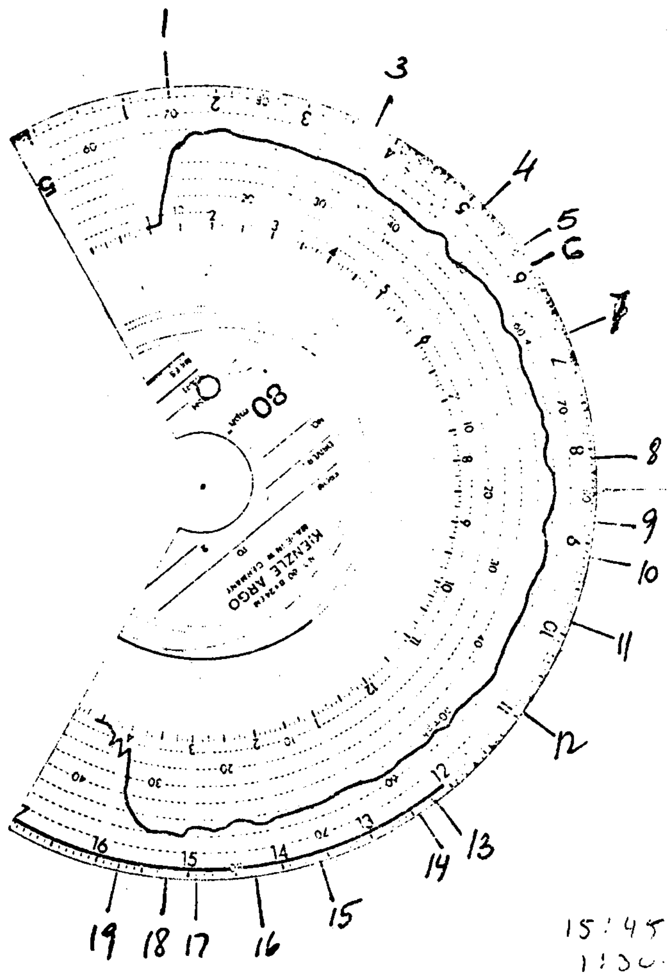
County, Route, Post Miles LA-10

Direction, AM or PM E/B A.M. Date and Day 5-7-75 WED

Weather and Light SUNNY

Vehicle CHC No. 3039 Lane (Median=#1) 2 Observer D. Lim

TIME: 0600



TT=14:15

1- LINCOLN BLVD. ON
2- CENTINELA AVE. ON
3- BUNDY DR. ON
4- RTE 405 CONN. ON
5- NATIONAL BLVD. O.C.
6- OVERLAND AVE. O.
7- MANNING AVE. O.
8- LA CIENEGA C/D OF
9- LA CIENEGA C/D ON
10- WASHINGTON BL. O.
11- LA BREA C/D OFF
12- CRENSHAW BLVD. O.
13- WESTERN/NORMANDIE C/D OFF
(14)- WESTERN AVE. O.C.
15- VERMONT AVE OF
16- S/B RTE 11 CONN. O.
17- N/B RTE 11 CONN. OF
(18)- GRAND AVE. OFF
19- MAPLE AVE. OFF

15:45
1:30
14:15

18 — 15,25
14 — 12,18
4 — 7,06
1 — 1,50

Notes or Remarks:

1. All points are off-ramp noses unless otherwise indicated.
2. TURN AROUND @ MAPLE AVE EAST END.
" " @ LINCOLN BLVD WEST END.

WORKSHEET

Page 1

Location	From	To	Direct.	Date	Time	Travel Time	Miles	MPH	LA CIENEGA → GRAND			WESTERN → GRAND		
									Distance	Travel Time		MILES	TIME	
Santa Monica Fwy. (LA-10)	Lincoln	Grand	E/B	2-25-75	0620	14.00	12.9	54.97	6.45	7.72		2.5	3.00	
				TUESDAY	0645	15.00		51.60		8.45			3.25	
					0700	29.08		27.56		16.55			4.53	
					0736	31.09		24.90		16.30			5.42	
					0815	29.08		27.56		15.74			4.66	
					0929	—		—						
				2-26-75	0600	14.75		52.47		10.50			3.08	
				WEDS	0620	14.50		53.38		7.75			2.97	
					0640	16.00		48.38		12.08			3.33	
					0700	20.16		38.39		12.33			3.75	
					0720	26.42		29.30		16.17			3.67	
					0745	23.33		[illegible]2.49		14.58			3.42	
					0901	24.67		31.37		13.92			4.92	
					0930	19.83		39.03		12.17			3.17	
				2-29-75	0600	14.50		52.38		7.50			4.91	
				FRIDAY	0615	14.25		54.32		7.46			3.91	
					0635	15.08		51.33		8.25			3.25	
					0700	17.17		40.39		11.58			3.58	
					0715	26.7[illegible]		28.93		17.83			3.50	
					0730	28.60				18.17			3.52	
					0745	25.50		30.35		15.89			3.67	
					0800	24.17		32.02		15.00			3.20	
					0915	23.25		33.29		13.79			3.17	
					0930	22.00		35.13		13.65			3.15	
					0900	16.25		[illegible]		9.58			3.17	
				3-3-75	0600	14.00		55.29		7.17			2.58	
				MONDAY	0615	13.33		58.06		7.00			2.66	
					0630	15.42		50.19		8.25			3.08	
					0645	15.75		49.14		8.75			3.50	

Appendix B (1)

CO. LA RTE 11 LOCATION Adams Bl(21st St. P.O.C.

DIRECTION S/B DAY Tues DATE 5/4/76 BY ____

TIME	1	2	3	4	5	6 +	BUSES	People/Vehicles = OCC.
00-30	192	38	13	2	1	—	1S(Y*)	320/246 = 1.30
30-00	178	38	2	4	1	—	1S(F)	281/223 = 1.26
15-16	370	76	15	6	2	—	(2)	601/469 = 1.28
00-30	155	39	9	—	—	—	1L(E)	260/203 = 1.28
30-00	174	27	5	1	—	—	—	247/207 = 1.19
16-17	329	66	14	1	—	—	(2)	507/410 = 1.24
00-30	159	33	6	1	—	—	1SC(E)	247/199 = 1.24
30-00	134	37	8	1	2	—	1RTD	246/182 = 1.35
17-18	293	70	14	2	2	—	(2)	493/381 = 1.29
00-30	128	30	7	1	—	1	1SC(E)	219/167 = 1.31
30-00	116	24	13	3	—	1	—	221/157 = 1.41
18-19	244	54	20	4	—	2	(1)	440/324 = 1.36

2 OR MORE OCCUPANTS - 348 = 22.0 %

3 OR MORE OCCUPANTS - 82 = 5.2 %

%	78.0	16.8	4.0	0.8	0.3	0.1		
TOTAL	1236	266	63	13	4	2	(7)	2041/1584 = 1.29

CITY OF LOS ANGELES
DEPARTMENT OF TRAFFIC

24 HOUR TRAFFIC VOLUME

Appendix B (3)

LOCATION	DATE	DESCRIPTION	DAY OF THE WEEK
PICO BL W/O FIGUEROA ST	03-11-76	C 045 33 4 3	TH CR

HOUR BEGINNING	EAST BOUND 00-15	15-30	30-45	45-60	HOUR TOTAL	WEST BOUND 00-15	15-30	30-45	45-60	HOUR TOTAL	RATIO (E/W) 00-15	15-30	30-45	45-60	HOUR TOTAL
12 AM	23	26	20	3	74	32	25	28	21	106	.8	1.0	.7*	.1*	180
1 AM	17	10	25	11	63	19	11	26	19	75	.9	.9	1.0	.6*	138
2 AM	11	11	9	8	39	17	8	5	8	38	.6*	1.4	1.8*	1.0	77
3 AM	8	5	13	14	40	9	4	1	4	18	.9	1.5	13.0*	3.5*	58
4 AM	12	5	12	18	47	4	3	4	3	14	3.0*	1.7*	3.0*	6.0*	61
5 AM	17	33	37	33	120	5	4	8	11	28	3.4*	8.2*	4.6*	3.0*	148
6 AM	69	120	166	226	581	15	23	35	46	119	4.6*	5.2*	4.7*	4.9*	700
7 AM	242	251	289	288	1070	67	88	123	112	390	3.6*	2.9*	2.3*	2.5*	1460
8 AM	262	240	229	209	940	111	95	96	115	417	2.4*	2.5*	2.4*	1.8*	1357
9 AM	165	149	139	158	611	109	87	87	107	390	1.5*	1.7*	1.6*	1.5*	1001
10 AM	136	150	165	122	573	109	101	121	136	467	1.2	1.5*	1.4	.9	1040
11 AM	151	144	152	139	586	134	137	138	141	550	1.1	1.1	1.1	1.0	1136
12 PM	141	134	155	136	568	160	174	187	211	732	.9	.8	.8	.7*	1300
1 PM	144	155	157	146	602	228	219	197	165	809	.6*	.7*	.8	.9	1411
2 PM	182	146	157	159	644	176	172	136	183	667	1.0	.8	1.2	.9	1311
3 PM	160	172	179	211	722	180	180	184	220	764	.9	1.0	1.0	1.0	1486
4 PM	197	180	218	220	815	241	285	283	292	1101	.8	.6*	.8	.8	1916
5 PM	169	180	168	139	635	290	328	219	191	1028	.6*	.5*	.8	.7*	1664
6 PM	161	162	131	146	600	154	157	163	129	603	1.0	1.0	.8	1.1	1203
7 PM	105	113	114	83	415	126	109	96	71	402	.8	1.0	1.2	1.2	817
8 PM	102	92	85	94	373	93	77	79	58	307	1.1	1.2	1.1	1.6*	680
9 PM	133	134	84	64	415	55	70	73	49	247	2.4*	1.9*	1.2	1.3	662
10 PM	51	34	45	52	182	54	36	40	30	160	.9	.9	1.1	1.7*	342
11 PM	36	34	34	32	136	47	44	29	30	150	.8	.8	1.2	1.1	286

	EAST BOUND	WEST BOUND	TOTAL
6 HOUR TOTAL	4794	4090	8884
16 HOUR TOTAL	10151	8993	19144
24 HOUR TOTAL	10852	9582	20434

PEAK HOURS

	EAST BOUND HOUR BEGINNING	VOLUME	WEST BOUND HOUR BEGINNING	VOLUME	TOTAL HOUR BEGINNING	VOLUME
AM	7 15	1090	11 15	576	7 15	1524
PM	4 00	815	4 30	1193	4 30	1960

FORM NO. 253 REV.

59280 27990 4 03-11-76
53 03
PICO BL W/O FIGUEROA ST
81

COUNT SHEET

Co. LA Rte. 11 P.M. ____

Direction: N/B Day: Tuesday Date: 4/27/76

Count at: Adams Bl. Lane No. ___

Prevailing Weather Conditions: ☐ Light ☐ Dark ☐ Sunny ☐ Cloudy ☐ Rainy ☐ Foggy

Counted By: Badella, Even, Ercek, Fletcher

COUNT INTERVAL	ACCUMULATIVE VOLUME	INTERVAL VOLUME	RATE / HOUR
0600 - 15	1327	1327	5308
- 30	3160	1843	7372
- 45	5393	2233	8932
- 00	7322	1929	7716
0700 - 15	9383	2066	8264
- 30	11098	1715	6860
- 45	12926	1828	7312
- 00	15,047	2121	8484
0800 - 15	17,381	2334	9336
- 30	19,564	2183	8732
- 45	21,350	1786	7144
- 00	22,791	1441	5764
0900 - 15	24,294	1503	6012
- 30	26,072	1778	7112
- 45	27689	1617	6468
-1000	29183	1494	5976
TOTALS			

AM

Metering Rates EB-10 Rte. 2 to Rte. 11

		0600	15	30	45	0700	15	30	45	0800	15	30	45	0900	15	30	45	1000	15	30	45
4.	* Lincoln Bl.	5.0/1028					5.0/1028	3.0/1440									3.0/1440				
4.	◊L Cloverfield Bl.	4.0/600	4.0/600	7.0/400						7.0/400	4.0/600						4.0/600				
4.	Centinela Av.	10/300	10/300	18.0/180													18.0/180				
4.	◊L Bundy Dr.	6.0/450	6.0/450	8.0/360		8.0/360	6.0/450										6.0/450				
3.	* Overland Av.	16.0/400															16.0/400				
3.	◊R Manning Av.	18.0/180															18.0/180				
5.	National Bl. Robertson Bl.	12.0/260		12.0/260	18.0/180				18.0/180	10.0/300			10.0/300	6.0/450			6.0/450				
4.	* La Cienega Bl.	18.0/360										18.0/360	14.0/448		14.0/448	11.0/552	11.0/552				
5.	◊L Venice Bl.	18.0/180										18.0/180	13.0/240				13.0/240				
5.	* Washington Bl.	8.0/720	8.0/720	12.0/520			12.0/520	11.0/552					11.0/552	6.0/900			6.0/900				
5.	La Brea Av.-SB	10.0/300											10.0/300	7.0/400			7.0/400				
5.	* La Brea Av.-NB	10.0/600			10.0/600	13.0/480	13.0/480	9.0/654									9.0/654				
4.	◊L Crenshaw Bl.	4.0/600	4.0/600	5.0/514													5.0/514				
5.	* Arlington Av.	9.0/720		8.0/720	5.2/1000		5.2/1000	4.0/1200	4.0/1200	5.2/1000				5.2/1000	8.0/720		8.0/720				
3	◊R Western Av.	5.0/514				5.0/514	4.0/600				4.0/600	9.0/327			9.0/327	5.0/514	5.0/514				
3.	Normandie Av.	6.0/450		6.0/450	7.0/400									7.0/400	6.0/450		6.0/450				
4.	◊R Vermont Av.	6.0/450				6.0/450	7.0/400					7.0/400	13.0/240				13.0/240				
4.	Hoover St.	8.0/360	8.0/360	11.0/276		11.0/276	18.0/180						13.0/180	8.0/360			8.0/360				

3-15-76

* -- 2 lane metering

◊L -- Carpool lane (Lt. or Rt.)

10.0 -- Red time (sec.)

600 -- Hourly rate per 15 min. period

ALIL
OBSERVER

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

Appendix B (5)

CHECK OF TIME AND PASSENGERS

SHEET 2 OF ____ SHEETS

WEATHER Clear NAME OF LINE West Pico - East First St. Floral Dr. LINE 26 DATE 6-29-76

SCHEDULE NO. ________ OBSERVED AT Pico @ Rimpau DAY OF WEEK Tue

N. (E.) S. W. INBOUND

VEHICLE NUMBER	BUS RUN	ROUTE	SEATS	PASSENGERS ~~ARR~~	~~ON~~	~~OFF~~	DEP	TIME (AM-~~PM~~) ACTUAL ~~ARR~~/DEP
7399	7		47				2	7:21
6116	65		51				18	23²
7038	17		51				8	27
7017	27		51				0	28
6177	61		51				1	30
6184	66		51				25	34²
6203	4		51				5	38
—			[illegible]				[illegible]	
6230	8		51				10	41
6194	67		51				13	45
6118	68		51				2	48
6178	55		51				20	51
5903	69		50				2	53
6234	9		51				5	57
—			[illegible]				[illegible]	
5923	62		50				9	8:00
2250	28		48				10	:03
7405	70		51				7	:06
6201	3		51				4	:09
6228	1		51				13	:12²
			51				[illegible]	
5925	57		50				7	:21²
6224	10		51				6	:26²
6121	58		51				19	:32
6175	5		51				20	37
			[illegible]				[illegible]	

N. E. S. (W.) OUTBOUND

VEHICLE NUMBER	BUS RUN	ROUTE	SEATS	PASSENGERS ARR	ON	~~OFF~~	~~DEP~~	TIME (AM-~~PM~~) ACTUAL ARR/~~DEP~~
6177	61		51	30				7:20
6184	66		51	40				27
6203	4		51	29				29
6230	8		51	15				32
6194	67		51	17				36
6118	68		51	8				37
			[illegible]	139				
5903	69		50	38				45
6178	55		51	20				45
6234	9		51	3				46
5923	62		50	14				48
7405	70		51	24				56
6201	3		51	7				56
2250	28		48	27				57
6228	1		51	8				58
—			[illegible]	141				
6207	11		51	17				8:05
5925	57		50	14				07
6224	10		51	5				08
6121	58		51	23				17
6214	5		51	19				17²
			[illegible]	78				
5922	18		50	7				8:20
6126	63		51	6				:23
6198	53		51	13				:25
6175	20		51	12				:27
5928	59		50	14				33
6196	52		51	2				33
6210	22		51	13				34
6179	64		51	3				35
			[illegible]	70				

20M 2-9-68

APPENDIX C

DETAILED DATA SUMMARIES

1) Freeway Traffic

2) Bus Statistics

    a) Bus Ridership
    b) SCRTD System-wide Statistics
    c) Bus Schedules

3) Accident Statistics

APPENDIX C-1

SANTA MONICA FREEWAY TRAFFIC MIX

(Occupancies from Western Avenue; Volumes from Crenshaw Sensor)

	Before	DURING Main Lanes	DURING ◆ Lane	DURING Total
Inbound Morning				
Percent 1-person cars	87.0	87.3	4.8	83.2
Percent 2-person cars	10.9	12.2	4.8	11.8
Percent carpools	1.8	0.4	76.5	4.1
Percent buses	0.3	0.1	13.9	0.8
Hourly 1-person cars	7,467	5,447	15	5,462
Hourly 2-person cars	939	761	15	777
Hourly carpools	157	28	244	272
Hourly buses	24	6	45	51
Total hourly vehicles	8,587	6,243	319	6,562
Hourly automobile passengers	9,873	7,016	848	7,864
Outbound Evening				
Percent 1-person cars	78.8	81.5	9.1	76.6
Percent 2-person cars	16.9	17.2	9.0	16.7
Percent carpools	4.0	1.9	75.2	6.3
Percent buses	0.3	0.0	6.6	0.5
Hourly 1-person cars	6,965	5,390	44	5,435
Hourly 2-person cars	1,497	1,139	44	1,183
Hourly carpools	351	78	367	445
Hourly buses	24	3	32	35
Total hourly vehicles	8,837	6,611	487	7,098
Hourly automobile passengers	11,166	7,910	1,359	9,269

APPENDIX C-2.1

AVERAGE DAILY BUS RIDERSHIP AND RIDERS PER TRIP
FOR OLD SCRTD SANTA MONICA FREEWAY ROUTES

DIAMOND LANE PROJECT WEEK	LINE #601		LINE #604		LINE #605		LINE #606		ALL OLD ROUTES	
	Average Daily Ridership	Average Riders Per Trip	Average Daily Ridership	Average Riders Per Trip	Average Daily Ridership	Average Riders Per Trip	Average Daily Ridership	Average Riders Per Trip	Average Daily Ridership	Average Riders Per Trip
BEFORE PROJECT										
-26	50.5	25	689	34.45	206	29.5	146	20.8	1,092	30.3
-25	54.5	27	736	36.8	221	31.6	160	22.8	1,171	32.5
-2	48.5	24	734	38.6	233	25.9	183	26.1	1,201	32.5
-1	51.5	26	764	38.2	235	26.1	185	26.4	1,235	32.5
DURING PROJECT										
1	107	13.4	768	38.4	275	21.5	218.6	18.2	1,370	25.9
2	123	15.4	789	39.4	275	21.1	219	18.2	1,406	26.5
3	103	11.9	764	38.2	288	22.2	232	19.3	1,387	25.8
4	120	12.6	780	35.6	285	22.4	219	18.3	1,404	24.6
5	112	11.2	700	26.9	265	17.7	181	12.9	1,258	19.3
6	98	16.3	804	30.9	322	21.5	231	16.5	1,456	23.9
7	90	14.9	815	31.4	288	19.2	222	15.9	1,416	23.2
8	147	24.5	750	30.0	345	23.0	206	14.7	1,448	24.1
9	87	14.5	832	32.0	322	21.5	232	16.6	1,474	24.2
10	80	13.3	827	31.8	296	19.8	245	17.5	1,449	23.7
11	142	23.7	847	32.6	333	22.2	222	15.9	1,544	25.3
12	84	14.0	806	31.0	351	23.4	226	16.1	1,467	24.0
13	71	11.8	733	28.2	313	22.3	279	19.9	1,396	23.3
14	82	13.7	754	29.0	338	24.1	266	19.0	1,440	24.0
15	95	15.8	854	32.8	343	24.5	226	16.1	1,518	25.3
16	95	15.9	796	30.6	326	23.3	290	24.2	1,508	26.0
17	99	16.5	774	29.8	329	23.5	293	24.4	1,496	25.8
18	110	18.3	799	30.7	326	23.3	303	25.2	1,538	26.5
19	100	16.6	782	30.1	294	21.0	327	27.2	1,508	25.9
20	78	13.0	777	29.9	339	24.2	323	26.9	1,517	26.1
21	94	15.6	747	28.7	370	26.4	296	24.6	1,507	26.0
22	83	13.9	692	26.6	317	22.6	279	23.3	1,371	23.6
SUMMARY STATISTICS FOR THE 22-WEEK PROJECT PERIOD										
Mean	101.2	14.6	776	32.3	305.9	21.9	244.4	19.25	1,427.5	24.57
Std Dev	19.96	3.12	65.58	5.39	38.73	2.665	44.15	4.29	118.08	2.529
Coeff Var										

APPENDIX C-2.2

AVERAGE DAILY RIDERSHIP AND PASSENGERS PER TRIP
FOR NEW SCRTD SANTA MONICA FREEWAY ROUTES

DIAMOND LANE PROJECT WEEK	SCRTD LINE #602		SCRTD LINE #603		SCRTD LINE #607		SCRTD LINE #608		ALL NEW ROUTES	
	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip
1	107.8	9.0	36.4	3.0	156.6	10.8			301	7.8
2	172.0	14.3	40.0	3.3	232.0	15.4			444	11.4
3	182.0	14.8	73.6	6.1	268.3	17.9	Started on April 19		524	13.3
4	202.5	16.9	60.0	10.0	290.	19.3			553	16.7
5	172.5	14.4	50.5	8.4	251.2	16.8			474	14.3
6	235.5	19.6	59.0	9,8	316.5	21.1	80.5	13.4	692	17.7
7	237.3	19.8	52.0	8.7	294.0	19.6	147.7	24.6	731	18.7
8	218.0	18.2	71.0	11.8	305.0	20.3	119.0	19.8	713	18.3
9	255.5	21.3	56.5	9.4	334.0	22.3	130.5	21.8	777	19.9
10	259.0	21.6	63.0	10.5	336.5	22.4	131.5	21.9	790	20.3
11	295.0	24.6	48.0	8.0	348.0	32.2	144.0	24.0	835	21.4
12	251.0	20.9	55.0	9.2	327.0	21.8	157.0	26.2	790	20.3
13	258.0	21.5	52.0	8.7	383.0	25.5	140.0	23.3	833	21.4
14	258.5	21.5	80.0	13.3	367.0	24.5	141.0	23.5	847	21.7
15	285.5	23.8	67.0	11.2	363.5	24.2	146.5	24.4	863	22.1
16	334.5	27.9	65.5	10.9	433.0	28.9	139.5	23.3	973	24.9
17	326.5	27.2			438.0	29.2	161.5	26.9	926	28.1
18	342.5	28.5	Discontinued on July 6		423.5	28.2	140.0	23.3	906	27.5
19	298.0	24.8			437.0	29.1	139.0	23.2	874	26.5
20	319.0	26.6			389.0	25.9	163.0	27.2	871	26.4
21	347.0	28.9			453.0	30.2	143.0	23.8	943	28.6
22	281.6	23.4			380.7	25.4	126.3	21.0	789	23.9
SUMMARY STATISTICS FOR THE 22-WEEK PROJECT PERIOD										
Mean	237.7	19.8	56.0	8.2	320.6	21.4	137.1	22.8	686	19.0
Std Dev	73.7	6.16	16.8	3.5	88.9	5.85	24.08	4.01	214.00	6.35
Coeff Var	.31	.31	.30	.43	.28	.27	.18	.18	.31	.33
Minimum	51.0	4.25	32.0	2.6	104.0	7.4	73.0	12.2	187	4.9
Maximum	364.0	30.33	103.0	17.2	464.0	30.9	175.0	29.2	1,006	29.2

APPENDIX C-2.3

AVERAGE DAILY RIDERSHIP AND PASSENGERS PER TRIP
ON SCRTD SANTA MONICA FREEWAY PARK-AND-RIDE ROUTES

DIAMOND LANE PROJECT WEEK	SANTA MONICA LOT LINE #708		FOX HILLS LOT LINE #746		CENTURY CITY LOT LINE #774		ALL PAR ROUTES	
	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip	Average Daily Peak Period Ridership	Average Riders Per Trip
1	215.4	15.4	67.0	4.2	46	2.9	329	7.2
2	248.0	17.7	105.3	6.6	50	3.1	404	8.8
3	228.7	16.3	116.3	7.3	61	3.8	407	8.8
4	258.2	19.5	145.5	9.2	59	3.8	465	11.3
5	222.2	13.9	146.8	8.2	78	3.7	428	8.6
6	246.0	15.4	170.5	9.5	77	4.9	495	9.9
7	211.3	13.2	142.3	7.9	56	3.5	431	8.6
8	207.0	12.9	155.0	8.6	Cancelled on May 10		418	8.4
9	216.0	13.5	186.0	10.3			402	11.8
10	219.0	13.7	177.5	9.9			397	11.7
11	203.0	12.7	183.0	10.2			386	11.4
12	229.0	14.3	206.0	11.4			435	12.8
13	202.0	12.6	170.0	9.4			372	10.9
14	219.5	13.7	207.5	11.5			427	12.6
15	244.0	15.3	227.0	12.6			471	13.8
16	216.0	13.5	195.5	10.9			412	12.1
17	164.0	16.4	163.0	16.3			327	16.4
18	149.5	15.0	142.0	14.2			291	14.6
19	136.0	13.6	120.5	12.1			256	12.8
20	144.0	14.4	126.0	12.6			270	13.5
21	155.0	15.5	115.0	11.5			270	13.5
22	125.0	12.5	109.7	11.0			235	11.7
SUMMARY STATISTICS FOR THE 22-WEEK PROJECT PERIOD								
Mean	207.1	14.9	143.5	9.57	59.8	3.7	380	10.9
Std Dev	45.31	2.36	44.14	3.04	13.91	.869	81.83	2.60
Coeff Var	.22	.16	.31	.32	.23	.23	.22	.24
Minimum	87.0	8.7	57.0	3.56	39.0	2.4	219.0	5.7
Maximum	280.0	20.0	240.0	16.80	91.0	5.7	522	16.5

APPENDIX C-2.4

SCRTD SYSTEMWIDE DATA**
FOR AN AVERAGE WEEKDAY IN JUNE 1976

SUPPLY FACTORS

Fleet Size	
- Peak	2,028
- Off-Peak	1,329
Vehicle Miles/Day	349,000
Vehicle Hours/Day	24,400
Effective Vehicle Speed	14.3
Service Frequency (Min)	
- Peak	15.0
- Off-Peak	60.0
Operating Cost/Day	$657,000

PRODUCTIVITY MEASURES

Riders Per Day	1,080,000
Riders Per Vehicle Hour	44.26
Average Occupancy Rate	11.1
Operating Cost Per Vehicle Mile	$1.88
Operating Cost Per Vehicle Hour	$26.93
Operating Cost Per Rider	$0.608
Revenue Per Rider	$0.166
Deficit Per Rider	$0.442

* Riders are unlinked weekday trips

** Source: SCRTD Statistical Digest for June 1976

SERVICE LEVELS

(March 15, 1976)

APPENDIX C-2.5

ROUTE	DATE OF CHANGE	TIME	TO LOS ANGELES CBD				FROM LOS ANGELES CBD			
			ARRIVE*				LEAVE*			
			First Trip	Last Trip	Peak Hour Headway	# of Trips	First Trip	Last Trip	Peak Hour Headway	# of Trips
PRE-DIAMOND LANE LINES										
601 Sunset Blvd.	9-28-75	AM	7:01	8:01	20	4	7:58	8:58	20	4
		PM	3:59	4:59	20	4	5:01	6:01	20	4
	4-19-76	AM	7:41	9:00	20/59	3	8:38	8:58	20	2
		PM	3:59	4:39	40	2	5:01	6:27	30/56	3
604 Venice Blvd.	6-15-75	AM	6:58	8:16	9	10	-	-	-	-
		PM	-	-			4:32	5:59	10	10
	4-5-76	AM	6:45	8:31	8	14	-	-	-	-
		PM	-	-	-	-	4:21	5:59	9	12
	5-24-76	AM	No Change				4:18	5:56	9	12
605 Marina Del Rey	9-28-75	AM	7:01	8:20	16	6	7:48	8:48	30	3
		PM	3:40	4:40	30	3	4:21	6:06	18	7
	4-12-76	AM	6:46	8:30	17	7	No Change			
		PM	No Change				4:21	6:26	18	8
	5-24-76	AM	No Change				No Change			
		PM	No Change				4:18	6:23	18	8
	7-5-76	AM	No Change				7:47	8:47	30	3
		PM	3:41	4:41	30	3	4:12	6:17	21	7

\- = No Service

* 18th and Grand (Inbound); Grand and Venice (Outbound)

Continued

ROUTE	DATE OF CHANGE	TIME	TO LOS ANGELES CBD: ARRIVE* First Trip	TO LOS ANGELES CBD: ARRIVE* Last Trip	TO LOS ANGELES CBD: Peak Hour Headway	TO LOS ANGELES CBD: # of Trips	FROM LOS ANGELES CBD: LEAVE* First Trip	FROM LOS ANGELES CBD: LEAVE* Last Trip	FROM LOS ANGELES CBD: Peak Hour Headway	FROM LOS ANGELES CBD: # of Trips
606 Culver Blvd.	9-28-75	AM	6:51	8:28	19	6	-	-	-	-
		PM	3:42	5:02	80	2	4:31	6:06	19	6
	4-12-75	AM	6:51	8:43	19	7	-	-	-	-
		PM	No Change				4:31	6:30	20	7
	6-27-76	AM	6:52	8:26	19	6	-	-	-	-
		PM	-	-	-	-	4:22	5:57	19	6
<u>LINES STARTED DURING DIAMOND LANES</u>										
602 Beverly Glen Blvd.	3-15-76	AM	6:56	8:21	16	6	7:48	8:53	32	3
		PM	4:04	5:04	30	3	4:36	6:01	14	7
	4-12-76	AM	6:56	8:36	20	6	7:48	8:58	35	3
		PM	No Change				4:36	6:26	22	6
	5-24-76	AM	No Change				No Change			
		PM	No Change				4:33	6:23	22	6
603 Century City	3-15-76	AM	6:51	8:14	17	6	7:43	9:08	30	4
		PM	3:54	4:54	20	4	4:36	5:56	16	6
	4-5-76	AM	7:11	8:14	32	3	8:13	9:08	28	3
		PM	3:54	4:54	30	3	4:56	5:56	30	3
	7-6-76		LINE DISCONTINUED							
607 LAX Airport	3-15-76	AM	6:51	8:55	21	7	6:57	8:47	37	4
		PM	3:23	6:53	30	8	3:18	6:48	23	10
	5-24-76	AM	No Change				6:57	8:46	36	4
		PM	No Change				3:18	6:46	23	10
	6-27-76	AM	6:45	8:47	20	7	6:52	8:32	33	4
		PM	3:16	6:47	30	8	3:02	6:32	23	10

Continued

ROUTE	DATE OF CHANGE	TIME	TO LOS ANGELES CBD				FROM LOS ANGELES CBD			
			ARRIVE*				LEAVE*			
			First Trip	Last Trip	Peak Hour Headway	# of Trips	First Trip	Last Trip	Peak Hour Headway	# of Trips
608 Malibu	4-19-76	AM	7:45	8:45	30	3	-	-	-	-
		PM	-	-	-	-	4:45	6:15	30/60	3
PARK-RIDE LINES, STARTED 3-15-76										
708 Santa Monica	3-15-76	AM	6:49	8:26	16	7	-	-	-	-
		PM	-	-	-	-	4:30	6:05	16	7
	4-12-76	AM	6:49	8:41	16	8	-	-	-	-
		PM	-	-	-	-	4:30	6:30	17	8
	5-24-76	AM	No Change				-	-	-	-
		PM	-	-	-	-	4:22	6:22	17	8
	7-6-76	AM	6:32	8:33	30	5	3:46	5:46	30	5
		PM	-	-	-	-				
746 Fox Hills	3-15-76	AM	6:52	8:40	15	8	-	-	-	-
		PM	-	-	-	-	4:26	6:11	15	8
	4-12-76	AM	6:52	8:55	15	9	-	-	-	-
		PM	-	-	-	-	4:26	6:26	15	9
	7-6-76	AM	6:32	8:33	30	5	-	-	-	-
		PM	-	-	-	-	3:47	5:47	30	5
774 Sepulveda-Century City	3-15-76	AM	6:56	8:44	15	8**	8:00		-	1
		PM	3:35	5:32	58	3	3:28	6:26	22	9
	5-10-76		LINE DISCONTINUED							

** Only 4 trips originate from and terminate at Sepulveda

Continued

ROUTE	DATE OF CHANGE	TIME	TO LOS ANGELES CBD				FROM LOS ANGELES CBD			
			ARRIVE*				LEAVE*			
			First Trip	Last Trip	Peak Hour Headway	# of Trips	First Trip	Last Trip	Peak Hour Headway	# of Trips
SMMBL 10	3-15-76	AM	6:50	8:45	23	6	7:33	9:30	30	5
		PM	3:35	5:45	32	5	4:05	6:28	20	8
	3-16-76	AM	6:50	8:45	19	7	No Change			
		PM	No Change				4:05	6:28	18	9
	3-17-76	AM	6:50	8:45	16	8	No Change			
		PM	No Change				4:05	6:28	16	10
	3-23-76	AM	6:50	8:45	13	10	No Change			
	3-25-76	PM	No Change				4:05	6:28	14	11
	7-9-76	AM	6:50	8:45	12	11	No Change			
		PM	No Change				No Change			
	8-2-76	AM	6:50	8:45	10	13	No Change			
		PM	No Change				4:05	6:28	13	12

APPENDIX C

TABLE C.3 - 1

ACCIDENT SUMMARY

SANTA MONICA FWY

LINCOLN BLVD. TO 0.5 MI E/O HOOVER ST.

WEEKLY TOTALS

Week	Date	Total	AM	PM	CLA	WLA	EB	WB	LANE: Median	LANE: ◇	LANE: 2	LANE: 3	LANE: 4	LANE: Other	Headon A	Sideswipe B	Rearend C	Broadside D	Hit Object E	Other H	EXTENT OF INJURY: Property Damage	Fatal	Severe Injury	Other Visible Injuries	Complaint of Pain
1	Mar 15-19	59	23	36	36	23	35	24	2	4	46	5	1	1	0	2	52	2	3	0	40	0	0	8	11
2	Mar 22-26	40	15	25	25	15	20	20	3	2	21	8	4	2	0	3	30	2	4	1	32	0	0	4	4
3	Mar 29 Apr. 2	31	10	21	28	3	20	11	2	0	18	4	0	7	0	2	27	0	2	0	22	0	0	1	8
4	Apr 5-9	21	7	14	16	5	13	8	1	0	11	3	0	6	0	2	16	0	3	0	14	0	0	2	5
5	Apr 12-16	28	4	24	24	4	12	16	0	2	20	1	0	5	0	4	23	1	0	0	19	0	0	3	6
6	Apr 19-23	33	13	20	20	13	21	12	2	1	18	5	4	3	0	3	27	0	2	1	27	0	0	1	5
7	Apr 26-30	26	11	15	19	7	10	16	1	2	16	0	3	4	0	2	22	1	1	0	25	0	0	0	1
8	May 3-7	19	7	12	14	5	13	6	2	3	10	2	0	2	0	3	13	0	3	0	17	0	0	1	1
9	May 10-14	22	10	12	15	7	12	10	0	0	13	2	3	4	0	0	19	0	2	1	15	0	0	0	7
10	May 17-21	36	7	29	31	5	18	18	1	1	23	4	2	5	0	4	31	0	1	0	24	0	1	6	5
11	May 24-28	9	3	6	8	1	4	5	0	0	5	0	2	2	0	1	7	0	1	0	8	0	0	1	0
12	Jun 1-4	19	8	11	11	8	6	13	0	1	9	4	3	2	1	1	17	0	0	0	16	0	0	1	2
13	Jun 7-11	24	6	18	19	5	12	12	1	0	15	2	2	4	0	3	18	0	3	0	21	0	0	2	1
14	Jun 14-18	25	5	20	17	8	12	13	1	2	15	0	3	4	0	4	20	0	1	0	20	0	0	2	3
15	Jun 21-25	25	9	16	16	9	19	6	1	3	11	3	1	6	0	2	18	1	4	0	21	0	0	1	3
16	Jun 28 Jul 2	23	6	17	17	6	15	8	1	1	12	2	2	5	0	2	18	0	3	0	20	0	0	0	3
17	Jul 6-9	14	4	10	11	3	9	5	1	1	7	2	0	3	0	1	8	1	3	1	6	0	0	4	4
18	Jul 12-16	14	2	12	14	0	6	8	0	0	8	1	0	5	0	0	14	0	0	0	12	0	0	1	1
19	Jul 19-23	16	9	7	13	3	8	8	2	1	10	0	1	2	0	3	9	1	3	0	14	0	0	1	1
20	Jul 26-30	27	8	19	17	10	16	11	2	3	16	2	1	3	0	4	22	0	1	0	20	0	0	5	2
21	Aug 2-6	16	7	9	11	5	5	11	1	0	6	1	1	7	1	1	11	0	2	1	14	0	0	2	0
21 Week Total	Mar 15 Aug 6	527	174	353	382	145	286	241	24	27	310	51	33	82	2	47	422	9	42	5	407	0	1	46	73
Cumulative %	Mar 15 Aug 6	100	33	67	72	28	54	46	5	5	59	10	6	15	0.4	9	80	2	8	1	77	0	0.2	9	14

Source: CHP Accident Reports compiled by Barbara Deden of Caltrans.

APPENDIX D

PUBLIC RESPONSE

1) Phone Center Material
2) Driver Survey Comments
3) Propaganda For Diamond Lane
4) Propaganda Against Diamond Lane

APPENDIX D-1

CONTENTS | PAGE NO.

INDEX

DIAMOND LANE

DATE: ______________________ SHIFT: ____ A.M. ____ P.M.

HOW DID CALLER HEAR ABOUT THE PROJECT?

- newspaper ad ☐
- radio ☐
- billboard ☐
- freeway sign ☐
- handout on freeway ramp ☐
- mobile information team ☐
- friend ☐
- other (specify) ☐ ______________________

TYPE OF CALL

positive ☐ negative ☐ information only ☐

INFORMATION REQUESTED

- carpools (vanpools) ☐
- buses ☐
- other (specify) ______________________ ☐
- fare information ☐
- park and ride ☐

ORIGIN OF CALL

home ☐ zip ______ office ☐ zip ______

TRANSPORTATION NOW USED

- bus ☐
- car
  - single ☐
  - 1 passenger ☐
  - 2 passengers ☐
  - 3 passengers ☐
  - 4+ passengers ☐

ADDITIONAL INFORMATION/COMMENTS

____

____

____

CALLER NON-ENGLISH SPEAKING

(specify) ______________________

REFERRED TO

SCRTD ☐ Commuter Computer ☐ CHP ☐ LA Traffic ☐

SMMBL ☐ CalTrans ☐ LAPD ☐ SM Police ☐

other ______________________ ☐

. . . .

INFORMATION PACKET (print only)

NAME ______________________

ADDRESS ______________________

CITY ______________________ ZIP ______________________

(ASK EVERYONE)

Base = 1256 %

9. Do you or members of your family use the Santa Monica Freeway?

REGULARLY......... 24.0
FREQUENTLY......... 15.3
OCCASIONALLY...... 33.1
NOT AT ALL........ 27.6

---

10. Did you or anyone in your family use the "Diamond Lanes?"

Base = 494

YES, CARPOOL...... 22.9
YES, BUS.......... 1.6
NO................ 74.5
DK 1.2

---

11. Do you believe the Santa Monica Diamond Lanes increased or decreased congestion?

%

ON THE FREEWAY ITSELF		ON ADJACENT SURFACE STREETS	
YES..........	87.4	YES...........	75.7
NO...........	7.1	NO............	7.7
DON'T KNOW...	5.5	DON'T KNOW....	16.8

---

12. Driving Diamond Lane hours, would you say it:

TOOK A LONGER TIME TO REACH YOUR DESTINATION.................... 69.0
TOOK A SHORTER TIME TO REACH YOUR DESTINATION.................. 8.9
OR ABOUT THE SAME AMOUNT OF TIME AS BEFORE THE DIAMOND LANES?... 12.8
DON'T KNOW................ 9.5

(IF LONGER, ASK:)
12a. About how much longer?

Base = 341

UP TO 10 MINUTES......... 28.2
UP TO 20 MINUTES......... 44.9
UP TO 30 MINUTES......... 18.5
DON'T KNOW.............. 8.5

12b. Was it longer in the morning or evening?

YES - LONGER EVENING..... 36.7
YES - LONGER MORNING..... 29.0
SAME..................... 24.3
DON'T KNOW............... 14.1

(IF LONGER)
12c. How much longer?

Base = 210

5 MINUTES...... 8.6
10 MINUTES..... 24.3
15 MINUTES..... 62.4
DON'T KNOW..... 5.2

---

13. Did you ever avoid the Santa Monica Freeway during Diamond Lane hours by using the surface streets or other freeways?

USING THE SURFACE STREETS 58.1
OTHER FREEWAY............ 13.2
NO....................... 36.2
DK 1.2

---

14. The Diamond Lane was the first major project of its kind in the nation. It reserved t fast lane of the Santa Monica Freeway for buses and carpools from 6:30 to 9:30 a.m., and from 3 to 7 p.m. It was designed to increase the people moving capacity of a freeway by encouraging car pooling and the use of buses, thereby conserving energy, improving air quality and reducing traffic congestion. Would you say this was a good, fair or poor way to achieve this objective?

GOOD.......... 10.7
FAIR.......... 14.4
POOR.......... 73.3
DON'T KNOW..... 1.8

---

15. As far as you know who was responsible for the Santa Monica Freeway Diamond Lane Project? (SHOW CARD B)

FEDERAL HIGHWAY ADMINISTRATION..................... 6.7
CALIFORNIA DEPT. OF TRANSPORTATION................. 56.9
ADRIANA GIANTURCO, CALTRANS DIRECTOR............... 31.4
CLEAN AIR ACT...................................... 4.7
CALIFORNIA LEGISLATURE............................. 6.5
DONALD BURNS, SECRETARY OF BUSINESS & TRANSPORTATION 5.3
GOVERNOR BROWN..................................... 7.9
OTHER (WRITE IN)______________ 3.6
DK 4.9

---

16. As of today, if it were put to a vote, would you vote For or Against renewing the Santa Monica Diamond Lane project?

FOR........ 11.5
AGAINST.... 84.8
DON'T KNOW. 3.6

O - questions reported in Los Angeles Times.

Results of Analysis of Diamond Lane Information Telephone Calls (n=4092)

Time of Day of Call (n=4092)	Percentage
7-8 A.M.	4.5%
8-9 A.M.	10.3%
9-10 A.M.	13.0%
10-11 A.M.	11.4%
11-12 noon	8.0%
12-1 P.M.	6.8%
1-2 P.M.	6.9%
2-3 P.M.	7.3%
3-4 P.M.	7.8%
4-5 P.M.	9.9%
5-6 P.M.	8.3%
6-7 P.M.	4.9%
7-8 P.M.	0.7%
TOTAL	100.0%

Source of Information about Diamond Lane (Percent of calls indicating each):

Newspaper ad	11.5%
Radio	5.1%
Billboard	0.9%
Freeway sign	35.3%
Freeway ramp handout	15.5%
Friend	1.7%
Other sources	6.8%

Present Transportation Used (n=2797)

Bus	4.3%
Auto - driver only	72.8%
Auto - 2 persons/car	15.9%
Auto - 3 persons/car	4.5%
Auto - 4 perons/car	1.6%
Auto - 5 or more persons/car	0.9%
	100.0%

Origin of Call (n=2474)

42 zip code districts within 3-miles of Santa Monica Freeway	67.1%
Other zip code districts in southern L.A County (zip codes between 90000 and 90199)	31.4%
Zip code districts outside southern L.A. County	1.5%

Caller non-English speaking; percentage of calls: 0.2%

Type of Call (n=3891)

Positive	13.4%
Negative	52.7%
Information only	27.9%
Positive and negative	0.3%
Positive; information requested	2.6%
Negative; information requested	13.2%
	100.0%

Type of Call by Type of Transportation Used

Type of Transportation	Type of Call (Percentage of Total)						
	Positive	Negative	Information Only	Positive & Negative	Positive & Information	Negative & Information	Total
Bus	42.3	18.9	33.3	0.0	3.6	1.8	100.0
Auto: 1-2 persons/car	14.1	55.8	23.6	0.4	2.4	3.7	100.0
Auto: 3-6 persons/car	34.6	36.3	22.0	0.6	3.9	2.8	100.0
Not reported	6.3	52.2	36.5	0.1	2.7	2.3	100.0
TOTAL	13.4	52.7	27.9	0.3	2.6	3.2	100.0

Specific Comments Recorded By Operators (n=2161)

Complaints	70.0%
Favorable Attitude	6.4%
Information Request	23.6%

Subject of Comments (n=261; incomplete coding)

Two-seat sportscar	28.0%
Motorcycles	14.9%
Unable to carpool	22.2%
Uses alternate route	0.4%
Definition of carpool	6.1%
Increased travel time on freeway	4.6%
Ramp delays or operations	17.6%
Media call	0.8%
Legal call	5.4%

Information Requested and Organization Referred to (some calls ask for more than one type of information and/or are referred to two or more organizations)

Information Requested	Percent of Calls Referred to:									
	# of calls	SCRTD	SMMBL	Commuter Computer	CalTrans	CHP	LAPD	L.A. Traffic Dept.	Santa Monica Police	Other Referral
Carpools	214	3.7	0.5	25.0	1.9	0.0	0.0	0.0	0.0	3.7
Buses	729	22.4	3.3	1.2	0.4	0.3	0.0	0.0	0.0	1.0
Fare info	38	7.9	2.6	0.0	0.0	0.0	0.0	0.0	0.0	2.6
Park-and-Ride	198	14.6	2.5	2.5	1.5	0.0	0.0	0.0	0.0	1.5
Other	778	2.8	0.6	1.5	2.2	0.3	0.1	0.0	0.0	3.2
Total Number of calls referred to each organization		234	40	88	82	17	3	2	3	101

Percentage of Calls to which an Information Packet was sent -28.7%

APPENDIX D-2

DRIVER SURVEY

COMMENTS: TABULATIONS AND EXAMPLES

Survey forms included an area for comments by the participants. The comments were categorized into groups demonstrating common areas of concern. Categories and sub-categories are listed below. Total number of comments in the category is stated, and a few examples provided.

I. Suggestions for General Improvement of Transportation: 80

"We should (1) charge licensing fees in proportion to car size as done in Europen countries, (2) charge higher gas prices for luxury vehicles and recreational vehicles which get poor gas mileage."

"I think we should go back to 65MPH limit."

"I believe in the need for gas rationing."

A. Create/Improve Public Transit: 214

"Los Angeles needs a rapid transit system like any other major city. Trains or monorail are best financed by a state or county lottery."

"When the hell are we going to have mass transit."

1) Spectific Mention of Need for Monorail or Overpass System: 53

"Monorail over the freeways or subway system, electric powered, would be my recommendation. Carpool, bus transportation and the Diamond Lanes only prolong the agony of already outmoded automobile transportation."

"We need a rail system -- to BART."

B. Better Use of Existing Facilities/Knowledge/Technology Needed: 52

"I would like to see more laws and protection for motorcycles."

1) Should Have More Efficient Engine/Fuel: 39

"Don't eliminate cars--redesign engines (no "add ons") and fuels to be smog-free (or electric, steam, etc.). It's not important that we have cars which will go from 0-60 in under 30 sec., or which have a top speed of over 100 MPH.

"Caltrans should continue to push hard for standards requiring auto makers to come up with clean, more efficient engines rather than playing around with schemes to prohibit workers from using their cars."

2) Build/Improve Freeways/Lanes: 50

"I'm in favor of revival of the development of new freeways and the expansion of capacity on existing freeways."

3) Designate Surface Roads as One-Way During Peak Hours: 8

"Designated high volume streets need to be made one-way during rush hours."

4) More Use of Signs to Advertise Road Conditions: 18

"W/respect to the multi-million dollar electrical signs on the SM F'wy, which serve No useful purpose at all, they should AT LEAST be used for the purpose for which they were intended, i.e. to provide current traffic info. all along the Fwy & not as advertisements for buses & carpools!!"

5) Improve/Increase Bus Service" 123

"If I had efficient bus transportation to work I would gladly use it."

"Have express buses start earlier in A.M."

C. Extend Use of Preferential Lanes: 15

1) Extend to 2+ Passengers per Car: 74

"It would have been beneficial if the Diamond Lanes could have been utilized by cars with 2 people or more."

"Make the Diamond Lane 2 people or more until such time that congestion in the Diamond Lane matches congestion in the other lanes, then make it 3 people or more."

2) Extend to Compact Cars w/2+ Passengers: 8

"I do feel the Diamond Lane was unfair to drivers of 2-seater autos—there should be some consideration for the small car owners as they are using less gas, etc. Perhaps allowing them to use the "diamond" like lanes if they have 2 people should be considered."

D. Discontinue/Restrict Buses on Freeway: 10

"Serious consideration should be given to restricting the bus and truck travel to the #3 & #4 lanes, leaving the fast lanes to passenger cars."

E. Enforcement Complaints/Suggestions: 40

"Ticket cars going too slow in fast lane."

"Minimum speed limit should be enforced."

"It is irritating to be waiting in the single driver metered lane and see single drivers using no-stop lane and 'getting away' with it."

F. Comments Concerning Metering: 156

"All on ramps should use metering."

"Ramp metering is very beneficial in smooth movement of traffic."

"Most problems are caused by your meddling with the on-ramps. Remove those meters and open all lanes to any traffic."

"Longer on ramp metering would keep short run driver from freeway."

G. Other General Comments: 69

"This proved to me that people will not give up their cars. I believe if price controls were removed & the free market allowed to work, that there would be some reduction in auto traffic."

"Notice change in traffic when schools are not in session. Suggest some program which change school participants use of freeways."

"Southern California freeway problems are unsolvable because of housing and economic situation. Can't find home close to work, can't afford to drive."

II. General Bureaucratic/Political Comments: 70

"People will not adjust their lifestyles to accommodate changes in freeway policies."

"Whether or not Caltrans knows or likes it, southern California was built by private transportation. Until public transport can be developed to deliver persons thru their individual destinations, no agency will successfully confiscate part of the roads (Diamond Lane) nor otherwise dictate special perogatives to a selected few."

A. Project is Infringement on Personal/Taxpayers'/Majority Rights: 119

"I think the Dept. of Trans. is infringing upon my personal rights by telling me to carpool, bus ride, or use certain lanes, etc."

"...to be forced to use the dumb, useless, illegal lanes and not the diamond lane was a pain. I should not be penalized for not having more people in my car - We all as liscenced & taxpayers be allowed to use ALL lanes at all times—"

"Government should not confiscate any rights to use any freeway lane."

"Caltrans can not (should not try to) "legislate" social change by restricting use of freeway for which all taxpayers are paying."

"I think Cal Tran should a close up show and git jobs that are productive not trying to tell the rest of us where, when and how to drive."

C. Caltrans' Attitude Toward Public Poor: 53

"Arrogance of Caltrans in initiating Diamond Lane probably doomed it to failure. Poor advance planning caused many commuters to misunderstand purpose and goals of the plan."

"I was incensed by the peremptory manner in which the Diamond Lane Project was instituted."

D. Need for Public Education & Public Input/Support of Projects: 50

"The major problem of the Diamond Lane Experiment was that it effected many people who had no choice in the final decision of the project & were directly involved in it."

"Why in the Hell was it implemented without putting it to a a democratic vote."

III. General Diamond Lane Comments: 47

"I felt that putting the ◇ lane in and saying "we'll take it out if it doesn't work" contributed to its failure."

A. Favorable Comments: 110

"Diamond Lane is innovative & may have worked given time."

"Believe it is a good idea & is the only way at present to force people that can carpool to do so, will in the long run save & help the terrible pollution problem we face - & will go on to our children."

"I feel that the diamond lane was the first steps in saving energy and lessening polution by encouraging carpools."

"Abandonment of the "Diamond Lane" concept was most unfortunate.The intent was a realistic step toward achievable mass transit - and the concept should have been supported at all governmental levels - and enforced. The number of single-occupant vehicles on the freeway is abhorrent."

"Bring back the Diamond Lane."

B. General Unfavorable Comments: 472

"The Diamond Lane concept is an abomination. It should be permanently discarded."

"I believe the "Diamond Lane" is the worst program to be enacted in my memory and I have seen some real beautys."

"Screw the Diamond lane not the Public."

1) Waste/Loss of Time Resulted: 139

"Long waits on on-ramps, finding alternate routes to avoid waits was very annoying."

"Cars had to crawl through from Harbor Freeway to La Cienega. I kept log on time of travel in P.M. - and the crawling of traffic had to add to air pollution. I was never able to drive in high gear."

2) Dangerous: 288

"I feel the Diamond Lane caused more accidents and near accidents than it was worth, I never saw so much glass. Busses & cars cutting quickly across 3 or 4 lanes of traffic just doesn't get it."

"Feel principal problem was danger due to hi speed stops & accidents."

3) Expensive: 44

"The Diamond Lane was a waste, a boon-doggle - the worst planned operation - & a waste of taxpayers money."

4) Psychologically Harrassing: 80

"Diamond Lanes created additional frustration to those using freeways leading to tempers flaring and bad driving judgements."

"Increased anxieties - promoted tailgating - it was a bomb!"

"It was a terrible & frustrating experience."

5) Increased Fuel Consumption: 123

"When you slow & stop traffic as the diamond lane did, it uses much more gas & causes more fumes, not less. Let's keep the traffic moving."

"Terrible waste of fuel by stopped vehicles or slowed vehicles using surface streets."

6) Increased Congestion: 225

"Diamond Lane added to congestion."

"Taking away 25% of existing lanes on freeway was bound to cause serious congestion on remaining 3 lanes, you kooks!"

7) Increased Air Pollution: 88

"I believe with the Diamond Lane on the SM Frwy we had (1) serious Air Pollution (no environmental study made) because of constant stop & go and many more people used surface streets also adding to smog."

"Air pollution increased from idling engines as traffic stacked up."

C. Conditional Comments: 77

" I feel the main problem with the Santa Monica Diamond Lane was the fact that an existing lane on a freeway that was designed to use 4 lanes for regular traffic was used for 3 or more people. The Diamond Lane (3 or more person) on the San Bernidino Frw. seems to work much better with a lane set apart from the existing 4 traffic lanes."

"A diamond lane would help people who carpool and would not hinder people who cannot if an additional lane was added instead of taking a lane away."

IV. Personal Comments: 274

"I have never taken the freeway to work in past 20 years."

"Diamond Lane was unfair to people like me who found it impossible to have a carpool through no fault of mine."

A. Work Time Frustrated Attempts to Carpool: 29

"The Diamond Lane caused me personal inconvenience - I don't always have a regular schedule & therefore can't accept the responsibility of a carpool, but I realize the necessity of trying to take action to solve our environmental problems. I considered the extra time & waiting necessary for me to be kind of a contribution."

B. Work Place Frustrated Attempts to Carpool: 27

"As you can see I travel a great distance to work and am unable to find carpoolers going in my direction."

V. Comments about survey: Neutral and Negative: 53

"Please Send Results to the Community after taking this Survey. We did answer your questions and we would like to see what you found, Maybe if enough people find we all feel the same than maybe we can collectively make a change."

"This survey seems to be designed to support a further attempt to force Diamond Lanes & carpooling on an unwilling public."

A. Positive Comments: 19

"Thanks for finally asking my opinion!"

"Good luck with your survey!"

THE DIAMOND LANE NEWSLETTER

First Issue May 24, 1976
Published in Santa Monica
Box 1821, Santa Monica, CA 90406

This Newsletter is being published for the information of bus riders and car poolers who use the Diamond Lane.

FIRST, THE GOOD NEWS:

--Studies show that one-passenger cars are now making their trip in no more time than before the Diamond Lane. Drivers in two person carpools, who can enter the freeway quicker, now travel to work in less time than pre-Diamond Lane.

--Bus ridership is more in the first month on the Diamond Lane than in the first five months of the San Bernardino Busway. And the Busway cost $57 million; the total costs for the Diamond Lane are less than $3 million.

--Accidents have steadily declined. Injury accidents are very few. Traffic experts say that after the installation of any new traffic control (such as a stop light), it can take months for accidents to return to normal. The trend on the Diamond Lane shows accidents declining in the usual pattern.

NOW, THE BAD NEWS:

--The Diamond Lane is in trouble because no one is speaking out in its support.

--Politicians are silent, because they think the public is opposed.

--The fate of the Diamond Lane may be decided in the next few weeks. Subsidy money may run out in early June.

WHAT YOU CAN DO:

--Write your local elected officials and ask them to support the Diamond Lane publicly and to extend the subsidy. (~~See reverse side.~~)

--Join the Citizens FOR the Diamond Lane so that we can make our voices heard through press conferences, etc.

Tear off and leave on your seat or give to our representative on Your Bus

I support the Diamond Lane . . . . ☐

I can volunteer some time . . . . ☐

Print Name

Office Phone No. Home Phone No.

Comments/Suggestions: ____________

Print Address

FRIENDS OF THE DIAMOND LANE P.O. BOX 1821 Santa Monica, CA 90406

PRESS RELEASE

For release: May 28, 1976

Contact: J. Zukor
624-2780 (work)
395-3753 (home)

FRIENDS
OF
DIAMOND
LANE

On Friday, May 28, 1976, at 8:00 a.m., Friends of the Diamond Lane will hold a news conference at the Centinalla Park and Ride Lot at Centinella and Ocean Park Avenues in Santa Monica.

Those present want to demonstrate wide community support for the concept of preferential lanes for buses and carpools.

Spokesman for the group, Jim Zukor a Santa Monica resident feels that The Diamond Lanes are already proving their effectiveness and must be continued.

"Diamonds can be your car's best friend," said Zukor.

Zukor, who commutes to work on the Diamond Lane, will announce commencement of a program aimed at boosting visible public support for the Diamond Lane.

10. Many cost increases have come about as a result of the operation of the Diamond Lane. These include the costs of law enforcement, observers, analysts and other officials, studies, accident repairs, attorney fees and medical costs.

We are acutely aware that we have transportation, energy and pollution problems. We want to see these problems either eliminated or relieved to the maximum extent possible, and we will not oppose any system which is intelligently planned, sensibly programmed and wisely administered. We will, in fact, give our full support to any sound and workable system.

The people of California are not rats in a maze to be studied for a determination of what level of frustration will be required to effect a modal shift. Nor do the people want to have their life style dictated to them by an overbearing bureaucracy that has already seen fit to throw their tax dollars around irresponsibly.

The people of California do not want to see their interests subordinated to back room politics and they believe that our State Government should be the servant of the people and not the master.

CITIZENS AGAINST DIAMOND LANES
Randy Kirk, Chairman

ENCLOSED PLEASE FIND,

FOR YOUR CONVENIENCE:

A BUMPER STICKER FOR YOUR CAR

AN ADDRESSED POST CARD TO THE GOVERNOR - (Just right your own comments, post and mail)

AN OPPORTUNITY TO HELP (Just fill out the information on our envelope - let us know how you can help.

THANK YOU

Citizens Against Diamond Lanes

Box 3558 • Culver City, California
(213) 359-1147. • (213) 559-8298

WHAT YOU SHOULD KNOW ABOUT THE DIAMOND LANE EXPERIMENT ON THE FREEWAY SYSTEM

Our Opinion of this Experiment

1. This system is UNCONSTITUTIONAL because it violates the "Equal Employment Opportunity" law by discriminating against people in many businesses and professions who travel at irregular hours and therefore can't carpool.

2. This system is ILLEGAL since no Environmental Impact Study was ever filed as required by law.

3. This system is INVIDIOUS since it was forced upon the public without the benefit of public hearings.

4. This system is IMMORAL not only because Caltrans had advance knowledge of a probable increase in the accident rate but, worse yet, has failed to terminate the experiment in the face of a 300 per cent increase in accidents This includes a 100 per cent increase in accidents involving injuries

5. This system is UNWORKABLE for many reasons. Foremost is the fact that unequal speeds in adjacent lanes invariably increase accident hazards.

6. This system is EXPENSIVE. At a time when all levels of government are suffering from a lack of funds, Caltrans is spending the taxpayers' money by the millions against the people's will as overwhelmingly expressed.

7. This system has SUBVERSIVE aspects, since the chief executive of the principal implementing agency, Mr. Donald E. Burns of Caltrans has publicly stated that he was bypassed and not informed of the Diamond Lane experiment until four days before it was placed in operation. It was then too late for him to do anything about the situation.

Facts about the Operation of the Diamond Lane Experiment

1. Freeway use has declined significantly.

2. Meanwhile, City surface streets are being used much more.

3. Freeway congestion has increased greatly.

4. Freeway congestion has backed up traffic on on-ramps and access streets, causing congestion there, too.

5. More fuel is being expended because of the stop and go driving conditions which have been imposed, and also because vehicles are seeking alternate routes on City surface streets.

6. Air pollution has increased because of the imposed stop and go driving conditions.

7. The accident rate has increased more than 300 per cent where the Diamond Lane is in use.

8. The number of additional people riding buses on the freeway is unknown, since many of these Diamond Lane riders were previously patrons of surface street buses. Statistics on the number of surface street bus riders are not conclusive.

9. Likewise, no one knows how much the three-person carpools have added to passenger traffic on the freeways, since formerly many of these cars held two persons.

over

CITIZENS AGAINST THE

"DIAMOND LANE"

CHAIRMAN-RANDY KIRK.............................PHONE 559-8298

TIRED OF WAITING 20 MINUTES ON FREEWAY ON-RAMPS?

TIRED OF THE "PUBLIC BE DAMNED" ATTITUDE OF OUR TRANSPORTATION OFFICIALS?

TIRED OF HAVING YOUR HARD EARNED TAX DOLLARS GO TO FREEWAYS WHICH THEN RESTRICT THEIR USE BY WAY OF THE DIAMOND LANE?

STOP THIS CANCER BEFORE IT SPREADS TO ALL OF OUR FREEWAYS

NOW THERE IS AN ORGANIZATION FOR YOU.

NOTICE: THERE WILL BE A MASS DEMONSTRATION IN FRONT OF GOV. BROWN FOR PRESIDENT HEADQUARTERS 4055 WILSHIRE BLVD.

DATE: SAT. MAY 15TH AND MON. MAY 17TH

TIME: 10:30 AM TO 1:30 PM

THE PRESS WILL BE NOTIFIED, WE NEED YOUR SUPPORT.

THIS DEMONSTRATION IS FOR CITIZENS AGAINST DIAMOND LANES.
FOR MORE INFORMATION, CALL RANDY KIRK, 559-8298

FREEDOM OF MOVEMENT IS THE AMERICAN WAY.

SUPPRESSION OF SUCH FREEDOMS IS THE COMMUNIST WAY.

W H I C H   D O   Y O U   C H O O S E ? ? ?

THE CAR POOL PROMOTERS AND THE FUEL SHORTAGE PLANNERS ARE MAKING IT MORE COSTLY AND DIFFICULT FOR US TO USE OUR AUTOMOBILES. THEY ARE WORKING TO TAKE AWAY OUR CARS AND PUT US ON GOVERNMENT-CONTROLLED, SO-CALLED "RAPID TRANSIT"--AND USE OUR TAXES TO PAY FOR IT!

THE ATTACHED SYNDICATED COLUMN FROM THE JOHN BIRCH SOCIETY OFFERS SOME MORE INSIGHT INTO, AND SOLUTIONS TO, THIS THREATENING NONSENSE. WRITE THE JOHN BIRCH SOCIETY IN SAN MARINO, CALIFORNIA (91108) FOR MORE INFORMATION ON HOW TO BRING ABOUT LESS GOVERNMENT.

APPENDIX E

PROJECT PROMOTION MATERIAL

FACT SHEET

SANTA MONICA DIAMOND LANE EXPRESS PROGRAM
(FACTS ON BUS OPERATIONS)

The Project

The Santa Monica Preferential Lane for buses, vans and carpools (vehicles containing more than three persons) is another in a series of projects by the California Department of Transportation (CALTRANS) to favor high-occupancy vehicles on Los Angeles County freeways.

CALTRANS will convert the Number One lane on the Santa Monica Freeway from general use to accommodate buses, vans and carpools.

The preferential lane will serve high occupancy vehicles from 6 a.m. to 10 a.m. and from 3 p.m. to 7 p.m. Although bus trips on the freeway from the Westside to the Los Angeles Central Business District will be scheduled to provide morning and evening peak-hour commuter service, both RTD and Santa Monica Municipal Bus Lines will provide mid-day trips.

Sponsors

Sponsors are CALTRANS, the Santa Monica Municipal Bus Lines, the California Highway Patrol, the Urban Mass Transportation Administration and the Southern CAlifornia Rapid Transit District. Santa Monica Municipal Bus Lines and RTD will provide feeder and freeway express bus service. RTD will provide three Park and Ride facilities and lines to service these facilities.

CALTRANS will establish and maintain the preferential freeway lane. The CHP will enforce use of the special bus-carpool lane and assure safe operation of the rest of the freeway.

Feeder and Freeway Express Service

RTD will implement six new lines with multi-stop operation in the Westside. Passengers will board at westside locations and, once they enter the freeway, make the non-stop Santa Monica Freeway-Los Angeles trip in the preferential lane.

SMMBL Complementary Bus Service

Fixed route line (1) (Line 10 Santa Monica Boulevard)*

Local and Feeder services:

Line 2 -- UCLA/Westwood Park-and-Ride shuttle
Line 3 -- San Vicente Blvd./Westwood Park-and-Ride extension
Line 9 -- Sepulveda Blvd./Westwood Park-and-Ride extension
Line 14 -- Centinela Ave./Bundy Drive*

RTD Freeway Express Bus Service

Line 601 (Sunset Boulevard)
Line 602 (Beverly Glen Boulevard)
Line 603 (La Cienega Boulevard-Burton Way)
Line 604 (Venice Boulevard)
Line 605 (Marina del Rey)
Line 606 (Culver Boulevard)
Line 607 (La Tijera Boulevard-Los Angeles International Airport)*

RTD Park-and-Ride Service Lines

Line 708 -- East Santa Monica Park and Ride
Line 746 -- Fox Hills Park and Ride
Line 774 -- Century City Park and Ride

(Park and Ride service lines will operate generally between 7 a.m. and 9 a.m. and 4 p.m. and 6 p.m.)

RTD Bus Additions

To service freeway express lines	27
To service Park-and-Ride lots	+23
Total added buses	50

*Operates mid-day

Cost (For One-Year Period commencing March 15, 1976)

Bus operation (Freeway Express and Park-and-Ride service lines)	$2,263,000
Park-and-Ride lot personnel and preparation and leasing	198,500
TOTAL COST	$2,461,500

Estimated Patronage

(Assuming 30 percent draw of 12,400 potential passengers)

Freeway Express (3,800 one-way trips)	1,900 daily passengers
Park-and-Ride Service (3,600 one-way trips)	1,800 daily passengers
Total Annual Patronage (Assuming 255 work-day year)	1,887,000

Estimated Annual Revenue

Total estimated revenue	$405,000

Operating Deficit

$2,263,000
- 405,000 (Total estimated revenue)

$1,858,000

FACT SHEET

SANTA MONICA DIAMOND LANE EXPRESS PROGRAM (LANE AND ON-RAMP INFORMATION)

Definition - Diamond Lane

The fast lane of the Santa Monica Freeway (lanes nearest median) in each direction between Lincoln Boulevard in Santa Monica and the Harbor Freeway (12½ miles) will be set aside for vehicles with three or more people by means of large diamonds painted inside the lane and by directional signs which will be strategically placed along the freeway.

Purpose

To improve people-moving capacity of the Santa Monica Freeway.

Using the Diamond Lane

No special permit or sticker is needed to use the Diamond Lanes. THERE WILL BE NO BARRIERS, SO BUSES AND VEHICLES WITH THREE OR MORE PEOPLE CAN ENTER OR LEAVE THE DIAMOND LANE ANYWHERE ALONG THE ROUTE. Changing lanes should always be done with caution and courtesy.

Hours of Operation

The Diamond Lane freeway and on-ramp rules will apply Monday through Friday between 6 a.m. and 10 a.m. and between 3 p.m. and 7 p.m.

Using the Ramp

Any car with <u>two</u> or more passengers (including children) may use the Diamond ramp and bypass the meter, but they must use caution in the merging area. All vehicles must obey signals and signs at the street entrance to the ramp.

Ramp Locations with Carpool Bypasses

Eastbound (to Los Angeles)

Cloverfield Blvd.
Bundy Drive
Manning Ave.
Venice Blvd.
Crenshaw Blvd.
Western Ave.
Vermont Ave.

Westbound (to Santa Monica)

Hoover (20th St.)
Vermont Ave.
Western Ave.
Crenshaw Blvd.
Fairfax Ave.

Special Ramp Westbound

Flower Street, towards the northbound Harbor Freeway (between 23rd St. and Adams Blvd.), for Santa Monica Freeway buses and carpools only - all day, 7 days a week.

Carpools will be able to enter the westbound Diamond Lane directly from the Harbor Freeway interchange without crossing other freeway lanes.

Preferential Left Turn Pockets

Special left-turn pockets for carpools with two (2) or more passengers and buses have been established at the following locations, and during the following hours:

Eastbound

Cloverfield - 6:30 - 9:30 a.m.
3 - 6 p.m.

Crenshaw - 6 - 10 a.m.
3 - 7 p.m.

Bundy - 6 - 10 a.m.
3 - 7 p.m.

Westbound

Western - 3 - 7 p.m.

Vermont - 3 - 7 p.m.

Crenshaw - 3 - 7 p.m.

Alternate Routes

Vehicles not eligible to use the Diamond Lane (buses and three-person carpools), while traveling between Santa Monica and downtown L.A., may be able to save on travel time and avoid waiting at metered ramps by using alternate routes on surface streets. Suggested alternatives are listed below:

North of Santa Monica Freeway
- Olympic Blvd.
- Wilshire Blvd.
- Third Street
- Beverly Blvd.
- Santa Monica Blvd.

North and South of Santa Monica Freeway
- Washington Blvd.
- Venice Blvd.
- Pico Blvd.

South of Santa Monica Freeway
- Rodeo Road
- Jefferson Blvd.
- Adams Blvd.

Project Enforcement

The California Highway Patrol will enforce the use of the special bus-carpool lane and assure safe operation of the rest of the freeway. Violaters will be cited.

Carpool Information

Forming a Carpool

Free help in forming carpools can be obtained from Commuter Computer (P.O. Box 76235, Los Angeles, CA 90076). Those who return a completed carpool form to Commuter Computer will receive a list of carpool candidates who live and work near them and have similar work hours. They can then call the names on this list and form their own carpool.

Carpooling can save the average commuter approximately $650 a year.

For Additional Information

There are several sources from which additional information on the Diamond Lane Express Project can be obtained. Complete information can be obtained by calling the special project information number -- 520-8111.

Other information contacts include:

Referral Phone Numbers

Southern California Rapid Transit District (SCRTD)

Information (toll free)

Los Angeles area.....................626-4455
West Los Angeles, Beverly Hills,
Culver City.........................273-0910
Santa Monica, Mar Vista, No. Holly.,
Canoga Park, Reseda, San Fernando,
Sun Valley, Van Nuys................781-5890

Spanish-speaking information operators..749-6455

Passenger Service (Complaints).........972-6235
Hours: 8:30 a.m. - 5 p.m. Monday thru Friday

Lost and Found.........................972-6174
Hours: 9 a.m. to 5:30 p.m. Monday thru Friday; 9:30 a.m. to 1:30 p.m. Saturday; Closed Sundays and holidays.

Commuter Computer..............................380-2290
Carpool (vanpool) matching

Caltrans.......................................620-3550
Technical information or problems, ideas for improving the system.

Santa Monica Municipal Bus Lines...............451-5445
Bus Information

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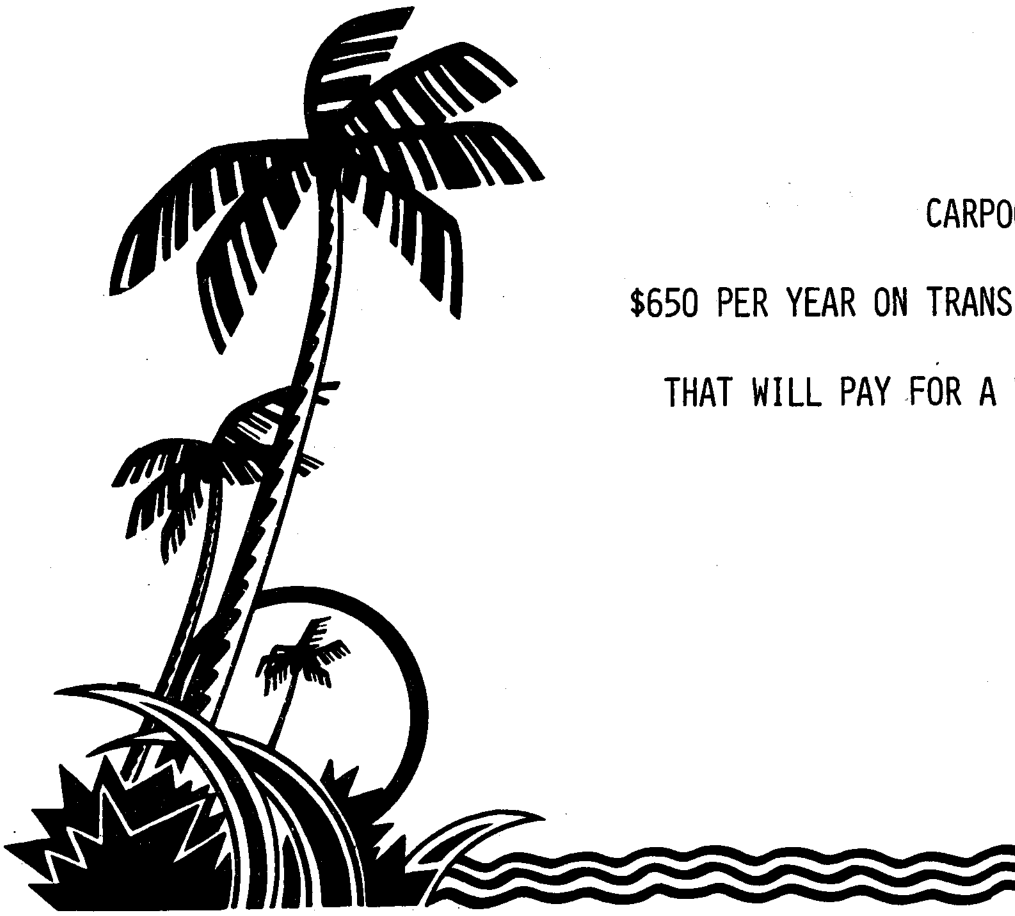

CARPOOLING CAN SAVE YOU

$650 PER YEAR ON TRANSPORTATION EXPENSES.

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IF YOU WOULD LIKE US TO SHOW YOU HOW TO BEGIN SAVING FOR YOUR TRIP TO HAWAII, LET US HELP YOU PLAN YOUR TRIP TO DOWNTOWN WITH OUR FREE CARPOOL/VANPOOL MATCHING SERVICE. CALL US TODAY AT 380-RIDE.

COMMUTER COMPUTER
3440 WILSHIRE BLVD.
LOS ANGELES, CALIFORNIA 90010

PHONE: 380-RIDE

APPENDIX F

SELECTED MEDIA CLIPPINGS

APPENDIX F

SELECTED MEDIA CLIPPINGS

The following media clippings were chosen from the Los Angeles Times, the Herald Examiner and the Evening Outlook during the duration of the Diamond Lane project. Attitudes developed soon after the project was initiated (second week) are represented in the first group of articles. Sample articles selected in June show attitudes well into the project (weeks 13, 14 and 15); and the article from July represents feelings towards the end of the project (week 19).

FREEWAY FIASCO

The Diamond Lane: Newest Caltrans Bust

"Los Angeles motorists are the most versatile, the most intelligent, the most adaptable . . . of any in the world."
—A Caltrans official

BY RAY HEBERT
Times Urban Affairs Writer

After little more than a week, it has become clear that state highway engineers—trying to compress travel on the Santa Monica Freeway—miscalculated the breaking point of most motorists who drive the busy route.

That point was reached March 15—Mad Monday, the day the California Department of Transportation implemented the Santa Monica Freeway's Diamond Lane Express.

Almost everything about the preferential lane project has been downhill since then.

An Analysis

Six weekdays of operating the experimental Diamond Lane program have shown it to be an ill-conceived undertaking that has taxed drivers' patience and thrown the entire Santa Monica-to-downtown Los Angeles travel corridor into a turmoil.

Caltrans' attempt to give the freeway a new configuration by excluding most of its users from the fast inside lanes has sent the accident rate soaring, created long delays and caused tempers—and engines—to boil over along the route's 12.5-mile length.

As a pilot effort, the preferential lanes also have subjected Santa Monica Freeway drivers to yet another traffic experiment in a long list of failures and made motorists wary of similar Diamond Lane programs planned for the San Diego, Long Beach and Artesia Freeways.

Under the Santa Monica Freeway program, only buses—some running nearly empty—and cars with three or more persons have been allowed in the fast lanes during the four-hour morning and evening rush periods.

Both resentment and defiance by commuters driving alone or with a single passenger have been high.

The lanes have been splattered with paint. Nails have been tossed on them. And some drivers, defying the law, have persisted in using the lanes despite repeated warnings.

The confusion the project has created on the freeway itself has had a wave-like impact on adjacent surface streets.

Indeed, it has been felt within the entire east-west travel corridor—a broad area generally extending from Santa Monica and Wilshire Blvds. on the north to Adams and Venice Blvds. on the south.

Many streets have been unable to handle comfortably surges of traffic caused by freeway commuters look-

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3/23/76

The Diamond Lane: Another Bust by Caltrans

Continued from First Page

ing for other routes.

Los Angeles City Traffic Engineer S. S. Taylor says the surface streets lack the capacity for additional traffic. Nor does the signaling system have the flexibility to control it.

Dismayed by the Diamond Lanes' reception, some Caltrans officials have pleaded with commuters to give the program a chance. They are confident it will work, given a fair shakedown period.

The mistake Caltrans made, critics feel, was selecting the Santa Monica Freeway for its initial test of preferential lane treatment. If exclusive lanes are to become commonplace here, another less busy, less exposed freeway might have been a better place to start.

Strong incentives are being used to coerce drivers out of their cars.

However, Caltrans says the Santa Monica Freeway was chosen because it is heavily used by commuters and because the conversion could be done inexpensively and quickly. White paint for the diamonds and a few new signs were all that was needed. Caltrans also believes the freeway has ample parallel streets to absorb traffic unable to use the preferential lanes.

Of those freeways scheduled for Diamond Lane treatment, the Santa Monica route is the only one where an existing lane is being designated for special use. Median shoulders, normally used only for emergencies, are being modified on the other freeways for buses and car pools.

The goal of the Diamond Lanes is to discourage freeway driving and relieve congestion as steps toward minimizing air pollution and saving fuel. Strong incentives, such as lengthy metered signals at some on-ramps, are being used to coerce drivers out of their cars and into preferentially treated buses and car pools.

From the start, Caltrans engineers have been concerned about the sudden upsurge in accidents on the Santa Monica Freeway. There were more than a dozen on Mad Monday. Mondays are normally the freeway system's busiest days. And, there were at least 10 on Friday. Some have involved injuries.

The California Highway Patrol says the accident rate has more than doubled, far surpassing the 10% to 12% increase officers feared.

Since the Santa Monica Freeway is one of the three busiest in the nation, carrying a daily load of more than 240,000 cars and trucks, it is subject—under the best conditions—to rear-end collisions and other accidents.

Yet many of the crashes in the project's first six days would not have occurred if freeway traffic patterns had not been altered so drastically by removing the inside lanes from regular use.

Even so, Caltrans has refused to relate the increased accident toll to the exclusive bus and car pool lanes. Its engineers insist no such assumptions should be made pending detailed studies of accident reports.

Defending the project, they have pointed out that each mishap jars the freeway's normal traffic flow, stopping it altogether or slowing it to a crawl. Often these slowdowns have spilled over into the preferential lanes.

Several times during both morning and evening rush-hour peaks, the freeway "never fully recovered"—as a Caltrans engineer put it—from these accidents. As a result, bus and car pool operations in the fast lanes were severely hampered.

In this connection, there is a feeling among the project's engineers that the concept of funneling high occupancy vehicles into preferential lanes would be viewed in a favorable light now if Mad Monday had gone differently.

On March 15, within 1½ hours after the Diamond Lanes were opened at 6 a.m. for their first test, four accidents occurred in a two-mile stretch. The result was chaos—overheated cars pinned in bumper-to-bumper lines along most of the freeway's length.

Caltrans officials believe the preferential-lane concept has proved itself operationally—if not in acceptability—in six days. By operationally, they mean that buses and car pools have encountered minimal trouble in bypassing waiting on-ramp traffic and cutting across several freeway lanes to reach the Diamond Lane.

Caltrans plays down lengthened red cycles at on-ramp signals.

But this is a delusion. Observations from helicopters have shown that some bus drivers have had to struggle through slowing or stalled traffic. And many car poolers have painstakingly maneuvered their way into the fast lane, only to reach it after it was too late to do any good.

One driver told of getting on the freeway at Overland Ave. in West Los Angeles one morning and finally reaching the preferential lane at Vermont Ave., just short of the Harbor Freeway and the end of the Diamond Lanes.

Those who complain say Caltrans has shown an almost wilful disregard for the average Santa Monica Freeway motorist—and those who normally use surface streets—since the Diamond Lane Express began operating.

The stench of burning rubber and gasoline fumes lingers at the metered on-ramps where lone motorists have waited up to 25 minutes to get on the freeway. Broken glass and bits of metal from minor accidents litter the onramps.

Prior to the Diamond Lanes' start-up, Caltrans crews lengthened some of the signals' red cycles to 18 seconds to make it harder for a person driving alone to get on the freeway.

Caltrans deliberately has played down this phase of the project. So far as is known, little has been done to readjust the signals to let more traffic on the freeway, even during non-peak hours.

Last Friday afternoon, for example, eastbound motorists—those traveling against the normal flow of rush hour traffic—waited up to 15 minutes to get on the freeway in West Los Angeles.

Yet, traffic on the freeway was moving smoothly. And, in a situation that has been repeated many times since Mad Monday, there were lengthy gaps between buses and cars with three or more persons in the preferential lanes. Few motorists were using them.

A traffic engineer—not with Caltrans—explains that an engineer is not easily dissuaded from changing his mind once he has decided how to approach a particular problem. His theory is that Caltrans is in that position now, despite angry protests against the preferential lane project.

One example used to illustrate this stubbornness is the use of wooden barriers to separate regular Santa Monica Freeway traffic from cars moving into the westbound freeway lanes from the Harbor Freeway.

During each of the preferential lane project's six days, no matter the hour, the limited funnel created on the Santa Monica Freeway's westbound collector road by the barriers has caused traffic to back up on the Harbor Freeway, often as far north as Sunset Blvd.

The barriers were removed temporarily for weekend motorists but were back in place again Monday.

The barriers were intended to give traffic a better chance to mingle. But they have been a source of as much annoyance to homeward-bound freeway users as the "slow" signals that have been preventing more cars from getting on the freeway at clogged on-ramps.

Caltrans' answer is that it is studying the problem and may remove part of the barrier. If it does, a few cars would be metered through the bottleneck.

Motorists who have no inclination to join car pools or who avoid riding buses, as most Los Angeles commuters do, have gone through the trauma of either bucking the jammed freeway or finding an alternate route. Neither works very well.

The Diamond Lanes have forced them to change their driving habits. Many living in the populous Santa Monica Bay area now allow up to 30 minutes additional driving time. Often that isn't enough.

Traffic 'Engineer Taylor, testing surface streets, says he took Olympic Blvd. outbound during the evening rush hour one day last week and made it to the San Diego Freeway in

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Freeway Diamond Lanes: Caltrans Pilot Effort Another in Long List of Failures

Continued from Third Page

50 minutes. Normally it takes 20.

Prior to the project's startup, many commuters were looking forward to using the Southern California Rapid Transit District's Santa Monica Freeway express buses. But the SCRTD's three park-and-ride facilities in Culver City, Century City and Santa Monica are not conveniently located, and the bus schedules are too limited. Few riders are using them.

During the Diamond Lanes' first few days, bus ridership increased from 1,000 one-way passengers to less than 1,400. Most already were commuting by bus anyway, and many of the new riders were on a new Santa Monica-to-downtown line established by the Santa Monica Municipal Bus Lines. The SCRTD's 45-passenger buses have been less than half full.

Varying claims have been made about the increase in car pools. Caltrans' figures have been difficult to sort out, but its counts show cars with three or more people nearing the 1,000 mark for a four-hour evening outbound period. On the project's first day, 750 used the westbound lanes during the evening peak and many more probably gave up trying to get through the bottleneck at the transition road from the Harbor Freeway.

Another set of figures, which are incomplete because of machine malfunctions, shows the effect disincentives have had on commuters who normally use the freeway. One morning last week traffic volumes on the freeway were 41,536 compared to nearly 50,000 during a similar four-hour period in December.

Much of the decrease occurred in the eastbound lanes as commuters tried to avoid the Santa Monica Freeway by using surface streets and other freeways.

Many motorists from the South Bay area, for example, have been traveling the San Diego and Harbor Freeways rather than buck waiting lines of cars at the San Diego-Santa Monica Freeway interchange. These transition roads, normally busy anyway, have become almost impossible bottlenecks since the preferential lane project began.

While the Diamond Lanes are intended to save fuel and help reduce air pollution, they have had the opposite effect. There is no ready way to determine how much additional gasoline has been burned by cars on traffic-clogged streets and on the freeway itself or how severely they have polluted the air. Eventually, such figures may be available.

Is the Diamond Lane project worth all the anxiety, confusion and ill-feelings it has caused?

Clearly Caltrans, intent on the program's operational phases, must believe it is.

So far it has seen no reason to change anything, although calls into its telephone center have been running about 55% negative. Less than 20% favor the program.

The agency has said it will take another week or two to determine how the lanes are working, but it also has contracted for a year-long evaluation with funds provided by the federal Urban Mass Transportation Administration.

The SCRTD and Santa Monica Municipal Bus Lines, both partners with Caltrans in the program, are concentrating on building bus patronage on lines using the Diamond Lanes. Initial reaction from many of the few hundred new riders has been favorable.

The fourth partner—the California Highway Patrol—has been busy responding to accidents and issuing hundreds of citations and warnings to drivers illegally using the special lanes.

Actually, the CHP is a reluctant partner. During the project's planning phases, the patrol is understood to have warned Caltrans about the tremendous hazards of running high speed buses and car pools in lanes adjacent to slow-moving traffic.

Despite all the initial resentment, there is little chance that Caltrans will make any major modifications in the Diamond Lanes and even less that it will scuttle the project.

Aborting it would require a recommendation by the joint project board, composed of the four partners, and a high-level decision by the state Business and Transportation Agency in Sacramento. So far, Donald Burns, the agency's secretary, likes the way the preferential lanes have been functioning.

Another factor that would weigh heavily against an unfavorable decision is Caltrans' commitment to open the first 10-mile stretch of the San Diego Freeway's Diamond Lanes for northbound buses and car pools in August.

Crews have been working for a year improving the freeway's median shoulders on the first section between the Santa Monica and Ventura freeways. By December, 1977, Caltrans expects to have the shoulders completed in both directions along 58 miles of the San Diego Freeway from the Ventura Freeway to the San Gabriel River Freeway.

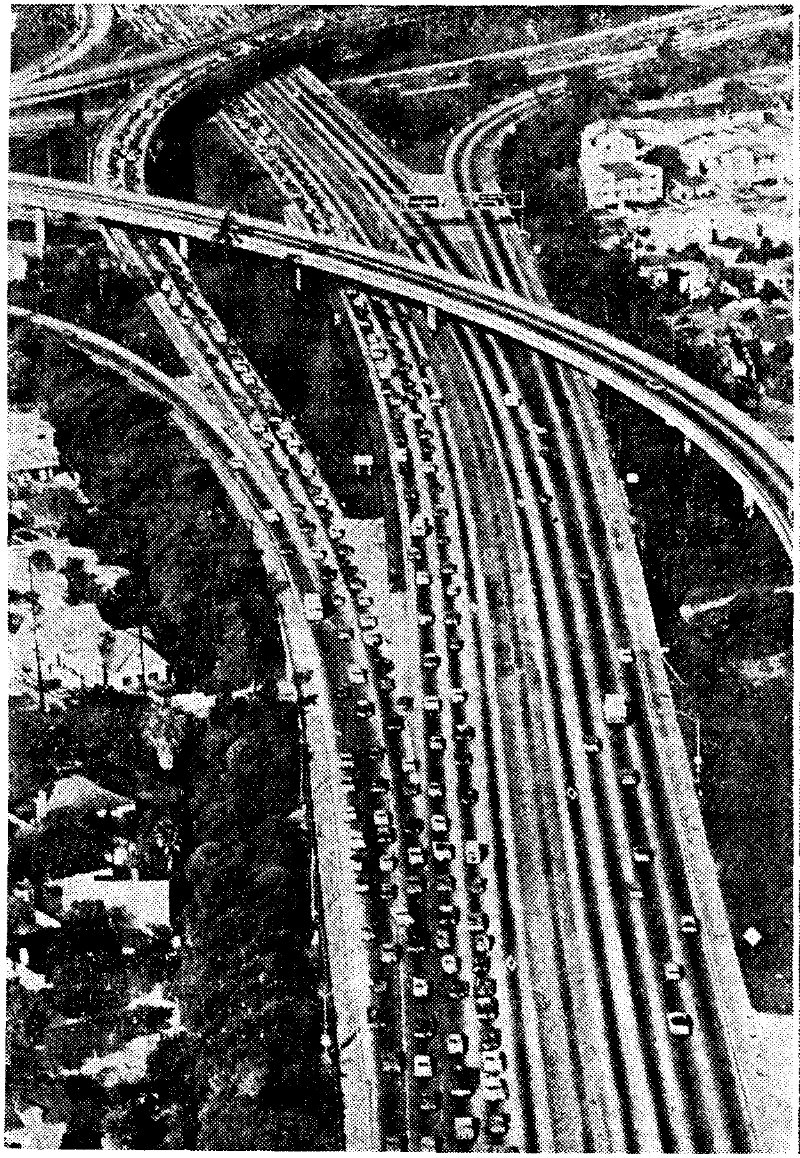
Caltrans also is aiming for late 1977 to have the median shoulders ready on the Artesia and Long Beach freeways. Improving them will allow buses and car pools to by-pass the normally jammed Santa Ana Freeway, the major freeway link between Orange County and downtown Los Angeles.

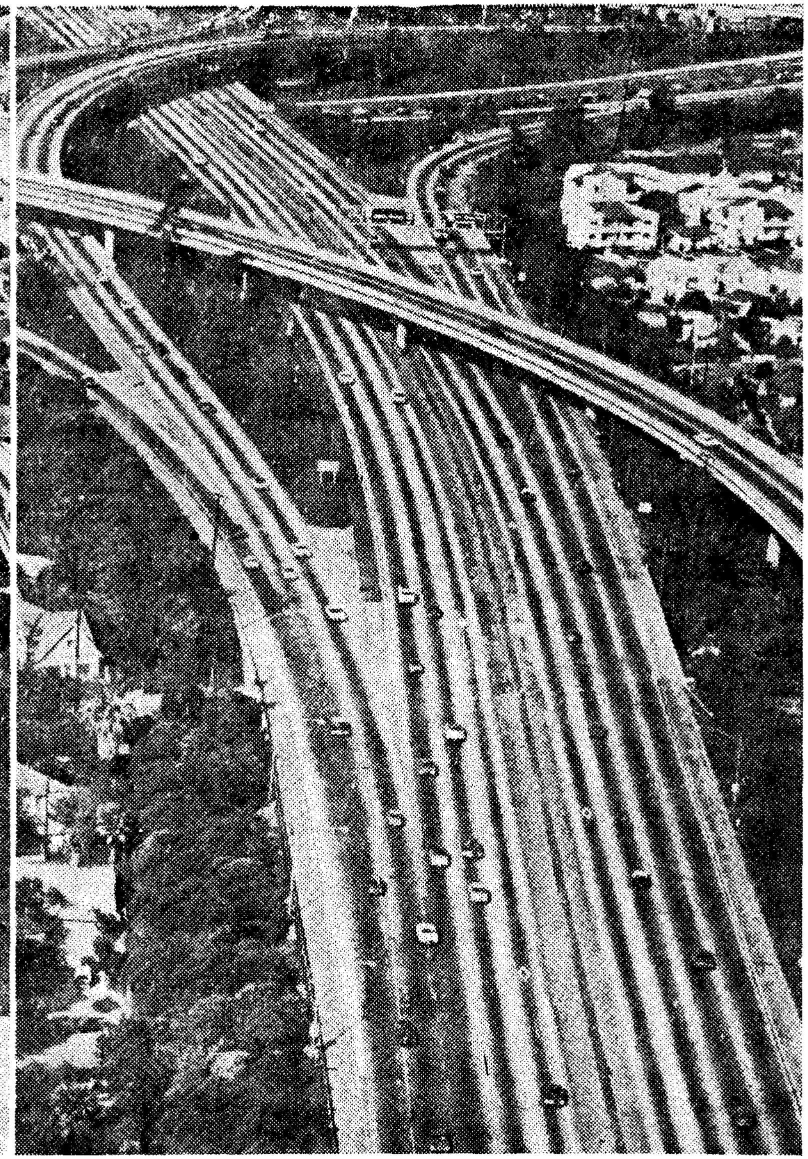
In addition, some on-ramps are being reconstructed on portions of the Harbor and Golden State freeways to give buses and car pools by-pass privileges.

These projects, together with those on the Santa Monica, San Diego and Long Beach-Artesia freeways, comprise the first stage of a $23.5 million regional preferential treatment program to get more people into buses and car pools.

All are an outgrowth of state highway studies dating back to 1970. They also were included in the Los Angeles region Transportation Control Plan prepared in response to the federal Environmental Protection Agency's controversial air quality requirements.

The Santa Monica Freeway was a difficult place to start. Any decision to return the freeway's Diamond Lanes to regular use could endanger the entire preferential treatment program.





IN THE BEGINNING—Aerial photo shows heavy morning congestion on the Santa Monica Freeway eastbound at the San Diego Freeway interchange on the first day of the Diamond Lane experiment.

FAST MOVING—One week later the morning traffic jam has disappeared on the same section of roadway. However, photo is not necessarily indicative of traffic flow elsewhere on the freeway.

Times photos by Art Rogers

Did Caltrans Follow Law?

16-Wed., March 31, 1976 EVENING OUTLOOK
Editorials
Reed McClure, Editor, Editorial Pages

It belatedly occurred to us that highway patrolmen and policemen wouldn't be writing tickets for preferential lane violations on the Santa Monica Freeway unless the motorists were breaking some law.

So, we looked up the pertinent section (21655.5) of the Motor Vehicle Code. What we found there suggests that the California Department of Transportation (Caltrans) may have played fast and loose with the law when it established the "Diamond Lane Express" for buses and private vehicles with three or more occupants.

The opening paragraph of the section reads as follows:

"The Department of Transportation and local authorities, with respect to highways under their respective jurisdictions, may authorize or permit exclusive or preferential use of highway lanes for high-occupancy vehicles. Prior to establishing such lanes, competent engineering estimates shall be made of the effect of such lanes on safety, congestion, and highway capacity."

One can assume from the sentence requiring studies "prior to establishing such lanes" that the legislature didn't want Caltrans to do anything that would have an adverse effect on "safety, congestion, and highway capacity." Otherwise, why bother with studies at all?

Well, it so happens that a safety study was made. A. L. Himmelhoch, a deputy district director for Caltrans, predicted prophetically last September that the experiment could cause a 10 to 12 per cent increase in traffic accidents. No one, to the best of our knowledge, questioned Himmelhoch's competency. Yet, Caltrans went ahead with the experiment anyway.

Now we come to the clincher.

The final paragraph of Section 21655.5 states:

"It is the intent of the legislature in amending this section to stimulate and encourage the development of ways and means of relieving traffic congestion on California highways and, at the same time, to encourage individual citizens to pool their vehicular resources and thereby conserve fuel and lessen emission of air pollutants."

State transportation bureaucrats have insisted that they have a right to make things tough for drivers of low-occupancy vehicles in order to force them to change their habits. They have taken steps, such as the metering of onramps, which cause additional highway congestion.

However, the act says loud and clear that the primary intent of the legislature was to use preferential lanes to reduce, not increase, congestion on highways. It also is obvious that other legislative goals — including fuel conservation and the reduction of air pollution — will not be achieved if traffic jams are worsened.

The preferential lane scheme struck us as illogical from the beginning. We now wonder whether it might be contrary to the intent of the law, too.

Los Angeles Times

PACIFIC LEGAL FOUNDATION

Conservatives Now Have Public-Interest Law Firm

BY STEVE LAWRENCE

SACRAMENTO (AP)—They might be called the conservative's storefront lawyers.

That's probably the best way to describe the 12 staff attorneys of the Pacific Legal Foundation, a public-interest law firm with a twist.

While other public interest lawyers battle on the side of environmentalists or welfare groups, Pacific usually finds itself aligned with developers and welfare watchdogs.

"We are the only public-interest law firm that is supportive of free enterprise and private property," says Ronald Zumbrun, the foundation's legal director.

"We feel you have to give equal weight to environmental, social and economic situations when you make a decision."

Organized three years ago, Pacific is rolled up a respectable record as a spokesman for what it believes are the views of most Americans.

It has gone to court to support welfare restrictions it considers legitimate and to attack environmental controls and growth limitation it views as unrealistic.

"We feel that governments have the right to impose reasonable restrictions on growth," Zumbrun says, "but they cannot do it with their heads in the sand."

In about 45 cases in which the foundation has been involved, it has been on the losing side in only one that has gone to final judgment.

It suffered setbacks in two cases still under appeal and credits itself with 25 victories, although Zumbrun says a few of those wins could still be appealed.

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The remaining cases are awaiting action.

The foundation was incorporated in March, 1973, as a nonprofit, public-interest law firm—the outgrowth of a conversation between Zumbrun and Roy A. Green Jr., then a California Chamber of Commerce official, now Pacific's administrator.

The foundation's initial staff consisted of Zumbrun, Green and two secretaries. Its first-year budget was $240,000.

The projected budget for this year is $1.2 million and its staff of 12 attorneys includes two in a Washington office.

Zumbrun says about 60% of Pacific's funds come from foundations and small donors. The rest are from businesses and various organizations.

Pacific was founded with the chamber's blessing, and although it is not affiliated with the chamber, its ties with the business community are strong.

Ten of its board members are officials with major business firms, and the board chairman, David James, is a partner with Arthur Young & Co., one of the nation's eight largest accounting firms.

Although the foundation frequently finds itself allied with business interests, it is not a "front" for the business community, Zumbrun says.

"We are supportive of free enterprise," he says. "When it is not working properly we do something in one direction. When it is working properly we will do something to support it.

"Our efforts benefit all segments of society, including the business segment. There is no question that the business community supports our efforts in this regard."

Early members of the foundation's legal team came together as part of a task force of state attorneys defending welfare restrictions implemented by former Gov. Ronald Reagan.

But most of Pacific's cases have involved environmental controversies.

It intervened in support of the Defense Department in a suit in which environmentalists challenged construction of a Trident atomic submarine base in Bangor, Wash.

It joined the state of California to oppose the Environmental Protection Agency's air quality control plan for the state.

And it tried unsuccessfully to overturn a growth control plan adopted by Petaluma.

The foundation has been drawn into controversies outside the courtroom. When it received a $21,000 fee for its work in a Humboldt County case, critics wondered if Pacific had jeopardized its status as a non-profit organization.

They also criticized Pacific for becoming involved in a case which involved the firm of one of its directors, Simpson Timber Co.

Zumbrun says there was no conflict because Pacific was representing the state forester, not Simpson, although the forester and Simpson were on the same side in the case.

The $21,000 was partial payment for Pacific's expenses, he said, and was not an attorney's fee in the traditional sense.

The Internal Revenue Service has since prohibited public-interest law firms from receiving fees except in certain circumstances when they are court-awarded.

Zumbrun says the ruling did not apply retroactively to the Simpson case. He also says there was no legal problem in Pacific being reimbursed for the consulting work it did early in its existence.

Pacific's role in about a third of its cases has been restricted to friend-of-the-court briefs, but Zumbrun says many of those briefs have raised new arguments that have shown up in the judge's decision.

"At least that indicates they're read," he said.

How other attorneys rate Pacific varies.

Two public-interest lawyers who have opposed the foundation in court say their legal work is competent. "But they are not super lawyers by any means," one of the attorneys said.

State Dep. Atty. Gen. Greg Wilkinson, who along with Pacific opposed an environmentalist suit seeking to block construction of Auburn Dam, gives the foundation mixed reviews.

"I would say that their contribution was minimal at best," he said. "The quality of their work on paper was reasonably good, but I would have to say I was not impressed with their performance in court.

"Their claim in victory in that case is weak at best."

But he credits Pacific with getting the judge to consider the dam apart from a proposed canal. "That helped us a great deal," he added.

Asst. U.S. Atty. Richard Nichols, who headed opposition to the suit, says Pacific came up with the argument that the judge accepted: Dam construction should go ahead while a faulty environmental impact statement was corrected.

"It's difficult to say how much they contributed," he

Los Angeles Times

Dishonesty With Diamonds

The California Department of Transportation, Caltrans, has issued a report tending to show that the Santa Monica Freeway's Diamond Lanes are a success. In fact, even if you believe that the figures Caltrans uses to prove its case are accurate, and we don't think they all are, the report shows that the Diamond Lanes are a failure. It supports our belief that the Diamond Lanes should be scrapped forthwith.

The report is an evaluation by Caltrans itself of the first nine weeks of operation.

Its principal findings:

—Fewer people and fewer cars are traveling on the freeway than before the Diamond Lanes were installed.

—The use of car pools and buses is insignificant compared to the total number of people carried on the freeway.

—The number of car pools increased in the first two weeks, but has remained constant since.

—Bus ridership increased dramatically in percentage terms, but the increase was insignificant in actual numbers. (In the meantime, the Rapid Transit District has once again cut its bus service for lack of patronage.)

—More cars have moved to surface streets.

—There are more accidents than before. This finding is supplemented by the Los Angeles city report showing more accidents on surface streets, too.

—The few people who travel in the Diamond Lanes move faster than before, but the many who do not travel in the Diamond Lanes move more slowly. Caltrans supplies figures to show that non-Diamond Lane traffic on the freeway moves only a very little more slowly than before. Frankly, we don't believe those figures, and we don't think the citizens who travel on the Diamond Lanes will believe them, either. Whether you go by freeway or, as increasingly people have to, by surface streets, it takes a lot longer than before the Diamond Lanes to go from east to west or west to east in the corridor served by the Santa Monica Freeway.

—No conclusions can be drawn about air pollution.

—Caltrans claims that less gasoline is being used, but its figures are vague and variable, and in any case Caltrans claims a cut of only 6%.

In considering these figures, as others in the report, we point out again that an independent count by The Times showed a substantially higher number of Diamond Lane violators and a substantially lower number of car pools than the figures released by Caltrans for the same two days.

Two things are especially interesting about this report:

First, it states clearly that Caltrans plans to continue the Diamond Lanes for at least a year. The SYSTAN Corp. of Los Altos has been engaged, though a grant from the federal Urban Mass Transportation Administration, to evaluate the Diamond Lanes "during the project's first year of operation." This projection directly contradicts the promise of Donald Burns, secretary of the State Business and Transportation Agency, that the project would be junked in a few weeks if it weren't working.

Second, it rests Caltrans' case for the Diamond Lanes on the premise that it will increase the use of car pools and buses. Since there never were as many buses on the Diamond Lanes as originally planned, and since the small number assigned to the lanes has been sharply reduced for lack of ridership, that leaves car pools.

But Caltrans' own figures show a very slight increase in the number of car pools since the first two weeks. How can Caltrans then rely on car pools?

The answer lies not in the report, nor in any official statements, but in a belief, a plan, or plot, if you will, that Caltrans is unwilling to share with the public.

Caltrans officials think that people won't go to car pools until they are persuaded that the Diamond Lanes are here to stay. In this they are supported by the sponsoring federal agency, the Urban Mass Transportation Administration.

Thus is explained the bureaucracy's intransigence, its stubborn prediction that the plan will last for a year, its peculiar insistence that the thing is a success when it's clearly a failure.

Caltrans may believe that hiding its hand, concealing its true intentions, is a clever ploy. We think it's dishonest, a form of dishonesty intolerable in a democratic government.

DIAMOND LANES STIR DISSENSION IN CALTRANS

BY RAY HEBERT
Times Urban Affairs Writer

Twice daily, engineers at the California Department of Transportation have been turning the Santa Monica Freeway's Diamond Lanes on and off —and taking a lot of heat for their trouble.

Routinely they have followed orders, operating the demonstration project according to plan.

But now after four months, an undercurrent of dissension is developing at Caltrans' staff level over the project designed to force commuters out of their cars and into buses and car pools.

"The unhappiness among some staff people is obvious," a Caltrans engineer, who insisted on remaining anonymous, said. "The Diamond Lane project was a good idea. There were good reasons to try it. It's had some amount of success . . .

"But the numbers—the results—don't justify the aggravation, the high accident rate, Caltrans' loss of credibility."

Credibility is an important part of the pride the career engineers, planners and other specialists who work for the big freeway-building agency have in their jobs.

Many were pleased to see Caltrans set out several years ago to improve its image by showing more concern for people and communities and less for land-consuming freeways. It even developed an attractive logo.

Much of the progress it had made was wiped out by the Diamond Lanes. Starting last March 15, dubbed "Mad Monday," Caltrans prohibited regular commuters from using the Santa Monica Freeway's two fast inside lanes and reserved them for buses and car pools during the morning and evening rush periods.

Since then, to many people, the Caltrans name has been synonymous with an imperialistic, "Go to Hell!" attitude.

Last Thursday, the Diamond Lane project, extending 12.5 miles from Santa Monica to downtown Los Angeles on one of the nation's busiest freeways, completed its fourth month as one of the nation's most controversial transportation experiments.

There is no sign of a change in the flow of orders that have come down from Caltrans' Sacramento headquarters to keep the project going.

Those orders, translating a philosophical commitment to get the most possible use out of the freeway without a mass of single-occupant cars, have filtered down from the Brown Administration through Donald Burns, state secretary of Business and Transportation, and Adriana Gianturco, Caltrans' new director.

Mrs. Gianturco is committed to the Santa Monica Freeway project and other related preferential use programs planned for Los Angeles area freeways. The next is scheduled—originally in September although it probably will be delayed several months—on a section of the San Diego Freeway.

Mrs. Gianturco repeatedly has said she believes the Santa Monica Freeway Diamond Lane project is working. She does not, she emphasized, consider it a failure.

It originally was scheduled for a one-year trial. On the basis of results so far, she said, the project is continuing.

"I think . . . what we're trying to do is worth fighting for," she said.

Excluding Saturdays and Sundays, the Santa Monica Freeway Diamond Lane project had operated for 90 days through last Friday.

Initially it was for eight hours a day. Now the exclusive bus and car pool lanes are in effect for seven hours—three in the mornings and four in the afternoons to serve peak hour commuter travel.

An Analysis

Because of the preferential treatment they get, there has been some increase in bus and car pool usage on the Diamond Lanes.

Furthermore, Mrs. Gianturco contends, traffic in the regular freeway lanes is moving better now than it was before the project started. This implies that the terrible congestion motorists first encountered on Mad Monday—with regular traffic squeezed into fewer lanes—is no longer a factor for noncar poolers.

However, there has been almost no letup in accidents occurring on the freeway while the Diamond Lanes are in effect.

Through July 2 there had been a total of 419 accidents. Seventy-four involved injuries. The freeway's normal accident rate for a similar period would have produced from 48 to a maximum of 272.

The freeway's continuing high accident rate, as well as other factors involved in Caltrans' headquarters handling of the Diamond Lanes, prompted this comment from a de-

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partment engineer here:

"Many of us feel uncomfortable with the whole project. We're very concerned. Caltrans is taking an undeserved beating. Its credibility has disappeared. I don't think people believe what we say anymore."

For example, Mrs. Gianturco contends the project has a "substantial amount" of support but she claims it has not been reported by the media.

The state Energy Commission, the state Transportation Board, Friends of the Diamond Lanes and other public bodies and private organizations have backed the project. The Los Angeles County Board of Supervisors also has refused to withdraw its subsidy for buses using the Diamond Lanes, an action indirectly supporting the project.

However, a running tally kept by Caltrans on public response to the Diamond Lanes shows overhwhelming negative citizen reaction.

Through July 9 a total of 2,124 critical letters had been received. There were 187 on the positive side. That breaks down to a split of 89% against and 8% in favor. The rest requested information or offered suggestions.

The balance of telephone calls has been almost as lopsided—77% negative, 7% positive. The rest wanted information.

Even so, a log of this type gives no real insight into whether the Diamond Lanes are actually achieving their objective or, indeed, whether preferential treatment is a desirable way to get a better use out of the Santa Monica Freeway and other routes.

A Caltrans engineer suggests that the cure—the Diamond Lane project—probably has shown itself to be worse than the disease it was intended to control.

The preferential treatment idea is to achieve a reduction in vehicle miles traveled by forcing commuters into buses and car pools with three or more persons. Theoretically this would conserve energy, ease air pollution and make driving for those who must use the freeway more comfortable.

The concept evolved from several different actions—the Clean Air Act of 1970, legislative directives and various transportation control plans for the Los Angeles region.

So far, about the only people who have benefited are the relatively few Santa Monica Freeway corridor com-

Engineer suggests that cure has proved to be worse than the disease.

muters who have switched to buses or joined car pools. Speeding downtown to work and home in the lightly used fast lanes, they are behind the project 100%.

But most of the freeway's regular users look upon the Diamond Lanes with the same taste they developed March 15 when they encountered a chaotic, 12.5-mile-long obstacle course.

Driving conditions vary, as they do on most freeways, from day to day, even hour to hour.

However, a random rush hour run on the Santa Monica Freeway is likely to produce frustrating stops and starts, unaccountable lane changes, a rear-ender in the Diamond Lanes, one- or two-person cars using those lanes in violation of the law and long stretches when there is no traffic at all in the exclusive lanes.

A freeway lane has the capacity to carry 1,800 cars an hour. But the only pattern to Diamond Lane traffic is that it is unusually light.

On a recent typical morning, the Santa Monica Freeway's eastbound lane averaged 320 cars and buses an hour, according to Caltrans' count. A few weeks earlier it had dipped to 295. Prior to March 15, the same lane carried 1,430 vehicles.

Many commuters, unwilling to put up with long waits at metered onramps, still are avoiding the freeway. Opting for other routes, they have jammed surface streets within the Santa Monica Freeway corridor from Wilshire Blvd. to Slauson Ave.

City Traffic Engineer S. S. Taylor says morning eastbound travel on these streets is up 17.2% since the Diamond Lane project began. Westbound traffic in the afternoon, he says, has increased 13.1%.

Caltrans disagrees. Its latest surface street figures, compiled from counts at different corridor locations, show 3.5% less traffic than before the Diamond Lanes were implemented.

This is for morning eastbound travel. Evening westbound traffic, however, is up 10.3% by Caltrans' count. Both figures are down substantially from surface street counts taken in the fourth week of the project.

Mrs. Gianturco says the figures show there is less diversion of freeway traffic to surface streets and motorists, no longer discouraged by metered onramps, are using the freeway again.

The figures, however, are indicative of the battle of numbers that has evolved over the controversial project, hampering a true evaluation of what has been happening on the freeway and within the Santa Monica Freeway corridor.

The dispute has covered most aspects of the program, ranging from its effect on air quality to bus usage and traffic on adjacent streets.

In connection with the impact on surface streets, for example, Caltrans' own nine-week report showed the project had diverted 18,050 vehicles, including 5,083 to surface streets, from the freeway during the Diamond Lanes' eight-hour operation period.

County Road Commission I. L. Morhar, who is monitoring the Diamond Lanes for the county Board of Supervisors, has come up with another set of figures. His found a 6% drop in freeway traffic—a total of 13,000 vehicles—compared to an increase of 12,000, or 8.9%, on city streets.

Some Caltrans engineers, meanwhile, contend the agency frequently has used figures for the Diamond Lanes in a misleading way to show the Santa Monica Freeway project in the most favorable light.

The actual numbers are compiled here. But written summaries attached to the weekly reports, a Caltrans engineer explained, are sometimes rewritten or modified at the agency's Sacramento headquarters.

Some Caltrans staff members find certain aspects of the nine-week report still puzzling. These include, for example, Caltrans' assumption that half the drop in vehicles diverted from the freeway—9,041—is due to people who are still using the freeway, apparently in car pools. The nine-week report put it this way:

"Approximately half (the decrease) . . . can be attributed to increased passenger occupancy in vehicles which continued to travel on the freeway in the rush hours."

Since the inception of its weekly project reports, Caltrans has especially noted the increased use of buses and car pools in the Diamond Lanes.

A recent report showed bus ridership, for example, at 258% of what it was prior to March 15. The arithmetic is

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correct but it also is deceptive since it is based on limited preproject ridership—about 1,660 daily trips compared to 4,235 in the project's 16th week.

Bus use, however, appears to be leveling off. The Southern California Rapid Transit District, operating buses over the Diamond Lanes with only a few passengers, has cut back its service 27%, reducing its project fleet to 48 buses.

Significantly, though, the fare increase which went into effect July 1 has had little effect on Diamond Lane patronage. The SCRTD says it has retained most of its riders, despite a 10-cent surcharge and other increases which raised the cost of longer rides to 80 cents. Before July 1 riders paid 50 cents for the heavily subsidized service.

Meanwhile, Robert Datel, district director for Caltrans in Los Angeles, had declined comment on reports of dissension within the agency's professional ranks. As for concern at the staff level, he said he does not share that feeling.

"This isn't the first project where our credibility has been questioned," he said. "I recall a far worse attack when we were trying to build a freeway across the Monterey Peninsula in the early 1960s . . . "

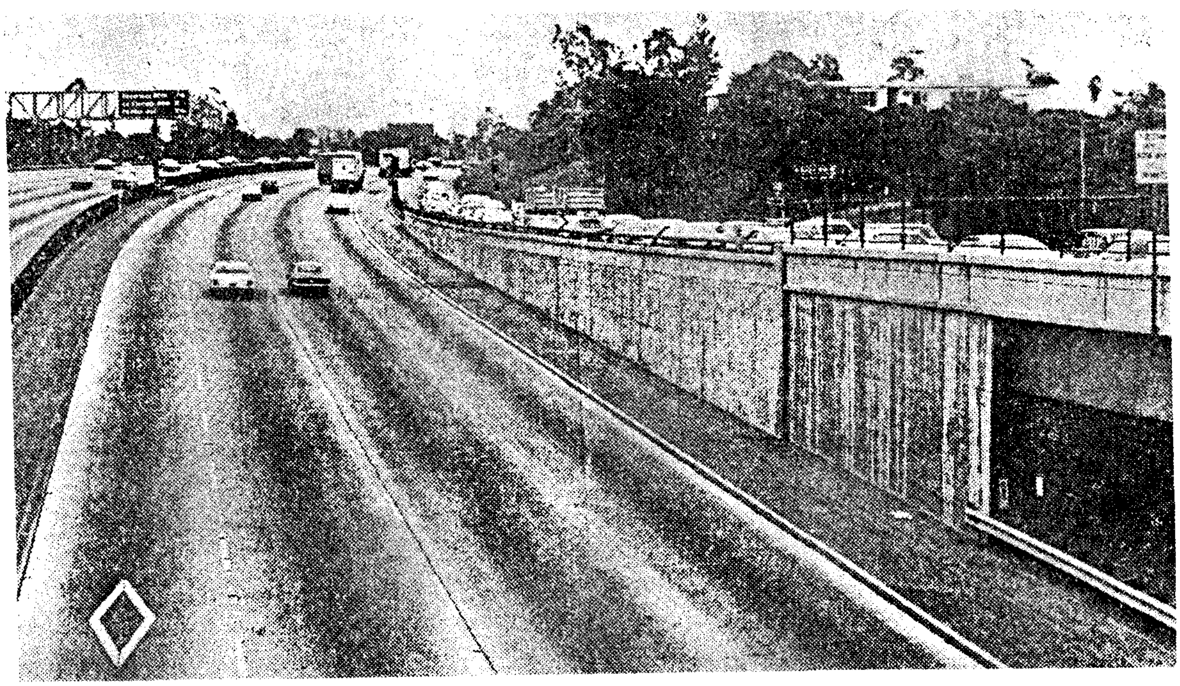
But Datel acknowledges that he is concerned, as other Caltrans people are, about the public's continuing refusal to accept the program and the continuing high accident rate.

Recently, Mrs. Gianturco, facing a television audience, summed up part of her philosophy about the Diamond Lanes with this observation:

"I think it's a responsibility of public officials to do what they think is in the public interest."

That reference, apparently to the Santa Monica Freeway's Diamond Lanes and the controversy it has generated, was received coolly by some Caltrans engineers here. One reacted this way:

"Most of us wish we were back building freeways."



CONTRAST—Eastbound Santa Monica Freeway is open but traffic is clogged at Overland onramp.
Times photo by George R. Fry

Los Angeles Times

6/11/76

A Total Flop

The time has come to chuck the Diamond Lanes.

This experiment on the Santa Monica Freeway doesn't work. It has not achieved its purpose. All evidence points to the conclusion that it never will.

Officials of the California Department of Transportation, Caltrans, are talking about continuing the experiment for a year. They cannot be serious. The Diamond Lanes started March 15. Donald Burns, secretary of the State Business and Transportation Agency, said in April that the state "will not persist in error and will junk it" if the project didn't prove itself in a few weeks. Well it's proved itself an utter failure, and junked it must be. Only a bureaucracy as mulishly obstinate as Caltrans would have continued it this long.

There is no objective reason for continuing it another day.

Cut through the foggy rhetoric of the department's spokesmen, and you find that the Diamond Lane experiment is a result of state legislation, local plans and the Clean Air Act of 1970, in which Congress set clean-air standards for the country and mandated several different ways to go to attain them. One way was setting standards for pollution coming out of the tailpipes of motor vehicles; that resulted in emission-control devices, which on the whole have worked quite well. Another way was setting standards for stuff coming out of smokestacks; that, too, was a sound approach. But Congress was told by the experts that in some parts of the country, like the Los Angeles Basin, neither kind of emission control would suffice to make the air clean enough, so Congress mandated these regions to produce a transportation-control plan, with the purpose of reducing the number of cars on the road. That's the genesis of the Diamond Lanes. They were Caltrans' response to commands for a plan.

Now the test of a transportation plan is whether it works. Does it reduce the total number of miles traveled, and so reduce air pollution? If so, does it do it at an acceptable cost?

The answer to these and the other pertinent questions about the Diamond Lanes is No:

—Air pollution has not been decreased by the Diamond Lanes; instead, it may have been increased.

—The total number of miles traveled has not been decreased demonstrably.

—Caltrans' own figures show clearly that the number of passengers carried by bus and car pool in the Diamond Lanes is insignificant.

—There is no prospect whatsoever of increasing either bus or car pool use. In fact, the Rapid Transit District is going to cut the number of buses it has on the Diamond Lanes.

—Instead of moving more people faster in fewer vehicles, the Diamond Lanes force the same number of people to move more slowly in roughly the same number of vehicles.

—Instead of easing traffic congestion, the Diamond Lanes increase it.

Another four or six or eight months of the Diamond Lanes is not going to change these facts.

Why then does Caltrans persist in error? To this question, its officials give no rational answers.

Caltrans' new chief, Adriana Gianturco, said that the Diamond Lanes have become "the symbol . . . the weathervane" for Caltrans' "environmentally responsible transportation role in the future." That is, quite simply, absurd. An experiment that fails on every count, as the Diamond Lanes do, is a symbol only of what not to do, and a weathervane that shows which way not to go.

We have been patient with this experiment to the point of unreasonableness, because, like everyone else here, we know we have to find ways to make our transportation system work better, and, to the extent we can, we have to reduce our dependence on the car. But the proof of a transportation plan lies not in whether you wish it would work, but in whether it actually does work, and the Diamond Lanes do not.

Does Caltrans wish, by persisting in error, to discredit all transportation plans? Does Caltrans wish to turn the Southern California driver, whose renowned skill and patience contribute much to the efficiency of the freeway system, into a frantic New Yorker or Parisian?

We suspect that Caltrans simply cannot bring itself to admit that its favorite project, in which it has invested so much of its time and prestige and so much of our money, is a flop. Several facts support our suspicion that pride and bureaucratic stubbornness alone keep Caltrans wedded to it:

—The only chance at all for the Diamond Lanes to have succeeded rested on adding a large number of buses to the freeway, and scheduling them so that they would be easy and attractive for people to use. Shortly before the Diamond Lanes began, the two bus agencies told Caltrans that they could not supply the buses they originally promised, and Caltrans nearly dropped the whole project. It should have.

—The evidence shows that, by cutting the number of cars on the Santa Monica Freeway, the Diamond Lanes have increased the number of cars on east-west surface streets. But Caltrans obstinately refuses to talk in public about anything but the traffic on the freeway itself.

—An independent count by The Times showed a substantially higher number of violators and a substantially lower number of car pools than the figures released by Caltrans for the same two days.

The failure of the Diamond Lanes and Caltrans' persistence in error raise grave doubts about the agency's competence to proceed with similar experiments it plans for other freeways.

Caltrans should abandon the Diamond Lanes immediately. If it will not make this decision by itself, Gov. Brown should order it to. Then the governor should order a thorough inquiry into the adequacy of the agency's future plans. Freeway transportation in Los Angeles is too important to be bungled the way the Diamond Lanes have been.

Los Angeles Times

Diamond Lanes: No 'Plot' Against Public

Rather, Says Transportation Chief, They Are Part of a Plan That's Working

BY ADRIANA GIANTURCO

During the last two weeks, The Times has published two lengthy editorials highly critical of the Diamond Lanes. I believe that both were based on false premises and, therefore, drew the wrong conclusions.

The Times also charged the California Department of Transportation (Caltrans) with dishonesty and conspiratorial motives in what I believe to be a totally irresponsible fashion. Since the editorials contained many allegations which should be answered, I feel it is appropriate to provide some background information on the Diamond Lane project and then to deal with specific points raised by The Times.

The Santa Monica Diamond Lane project was not conceived in the depths of an isolated bureaucracy and implemented as part of a plot against the public. The project was planned as one element in an overall short-term "Transportation Control Plan" (TCP) for the Los Angeles area in an attempt to meet the requirements of the Federal Clean Air Act of 1970.

The TCP, which explicitly includes the San-Monica project (as well as other preferen-[illegible] treatment projects, transit improvements and bicycle projects), was adopted in 1974 by the Southern California Assn. of Governments, which consists of elected officials from six counties and 127 cities in the region. The plan was intended to substitute for much more stringent controls (such as gas rationing) proposed by EPA, which were widely publicized at the time and which were essentially upheld in a federal court decision rendered in March of this year.

The preferential treatment program was to be implemented in two phases. In the first phase, four alternatives to encourage greater use of buses and car pools were to be tested. These alternatives were:

—Construction and use of separated, exclusive facilities for buses (this alternative has been in operation as the El Monte Busway on the San Bernardino Freeway since Jan. 1, 1975, and is planned as a two-year program).

—Use of *existing* lanes for buses and car pools. This is the Santa Monica project, implemented on March 15, 1976, and planned as a one-year program.

—Construction of *additional* lanes for buses and car pools, which is planned for the San Diego Freeway for fall, 1976.

—Ramp metering, with bypasses for buses [illegible] car pools and without preferential free[illegible]y lanes.

All these alternatives are to be evaluated and, in phase two, those that prove successful are to be extended to other freeways in the area.

While the short-term program had its genesis in the Clean Air Act, the high-occupancy vehicle projects included in it should serve not only to improve air quality, but also to save petroleum energy and to make a more efficient use of the massive investment we have made in the street and highway system.

For every car pool that is formed by three individuals who previously traveled alone in their automobiles, two vehicles will be removed from our congested facilities. Every additional bus rider, if he previously drove alone, means one less automobile on the road. Every car pooler and bus rider makes travel easier for others who choose or must ride alone. At the same time, the total number of vehicle miles traveled goes down, air pollution lessens, and gasoline consumption declines.

All this was a *plan* that is now being implemented. The question to be asked about *any* part of a plan is: How well does it work in reality, compared to other things we are or could be doing at various costs to achieve the same goals?

The costs are important: They include not only inconvenience and disruption, but also plain old taxpayer dollars. The Santa Monica project had a capital cost of approximately $100,000 for 12.5 miles both ways. The San Diego project, with new lane added in one direction only, will cost approximately $3.8 million for 9 miles ($422,000 per mile). The El Monte Busway had an initial capital cost of $57 million for 11 miles both ways ($5.2 million per mile).

Compared to all these are, of course, the costs of new freeway construction, which would undoubtedly relieve congestion in the short term, but is exceedingly disruptive in an urban area and is counterproductive in terms of air quality and energy in a longer period, and the cost to construct comparable mass transportation facilities (also disruptive and exceedingly expensive).

For example, the Century Freeway will cost approximately $50 million per mile. Cost estimates for fixed-rail systems, such as that recently turned down by the voters as Propositions R and T, range from about $22 million to $24 million per mile. The starter line, supported by The Times, would cost $1.2 billion, or $80 million per mile.

With a $100,000 capital investment, supplemented by approximately $600,000 in bus subsidies from March 15 to June 30, 1976, the Diamond Lanes on the Santa Monica Freeway have achieved substantial results, contrary to The Times' statements:

The Times claims that "Caltrans' own figures show clearly that the number of passengers carried by bus and car pool in the Diamond Lane is insignificant," and that "the use of car pools and buses is insignificant compared to the total number of people carried on the freeway."

Adriana Gianturco is director of the California Department of Transportation.

The facts are that prior to the project, 6.4% of travelers on the freeways rode in buses and car pools, and in the 13th week of the project this share had increased 15.5%. Given the constant attacks on the project by elected officials and the media and the well-ingrained driving habits of the public, this increase is remarkable and the current share is highly significant.

The Times alleges that "fewer people and fewer cars are traveling on the freeway than before the Diamond Lanes were installed" (June 16) and, contradictorily, that "the Diamond Lanes force the same number of people to move more slowly in roughly the same number of vehicles" (June 11).

The facts are that *both* the number of vehicles and the number of people using the freeway in peak hours have decreased, but the decrease in the number of vehicles has been considerably greater. In the project's 13th week of operation, 96% of the preproject number of travelers used the freeway, riding in 87% the preproject number of vehicles.

The Times states that "the Diamond Lanes have increased the number of cars on east-west surface streets. But Caltrans obstinately refused to talk in public about anything but traffic on the freeway itself."

The fact is that because it has been widely charged that our figures are too low we have repeatedly talked about the volume of traffic on surface streets. In the fourth week of the project's operation, our counts showed that traffic on east-west surface streets had increased by 18.3% (52,061 vehicles as compared to 43,995 before the project began). In the ninth week (our most recent available count), surface-street traffic dropped by 2,983 to 11.6% of its preproject level. Our fourth-week figures were confirmed a few days ago by the city traffic engineer, who for the first time released his own counts. They showed *less* of an increase than our counts.

The Times contends that "the total number of miles traveled has not been decreased demonstrably."

6/24/76

The fact is that a demonstrable reduction in miles traveled has been achieved in only 13 weeks. As a direct result of increased car pooling and bus ridership, combined with a leveling out of travel on the freeway throughout the day, 13,000 vehicles, which previously used the freeway in rush hours daily, were not making trips *at all* in these hours in the 13th week.

A conservative estimate indicated that on an annual basis 0.6 billion vehicle miles traveled (VMT) will be reduced by 32 million VMT, or 5.3%. This reduction can be translated into a savings of 770,000 gallons of gasoline. If the reduction that occurred between the 4th and 9th weeks is projected ahead, the annual decrease in gasoline usage would be 4.4 million gallons in the Diamond Lane's first year.

The Times claims that "air pollution has not been decreased by the Diamond Lanes; instead it may have increased."

The basis for this statement is mystifying. Our air sampling program shows that, in fact, carbon monoxide (the key indicator) has decreased in the corridor since the project started. We have drawn no final conclusions from these decreased readings, as air pollution is a complex variable to measure and depends on many factors. It is difficult to understand, however, on what factual basis The Times would contend that pollution may well have increased.

The Times states flatly and without qualification that "there is no prospect whatsoever of increasing either bus or car pool use."

One might ask: Is this a judgment from on high or is it a reasoned deduction from some, as yet unexplained, set of facts? Car-pool use, as The Times noted, has somewhat leveled off since the 7th week, but numbers from week to week have varied, and there is no reason to believe this is a permanent, ultimate plateau.

But use, in stark contradiction to the editorial, has been on a steady rise to the 11th week and has somewhat dropped off the last couple of weeks. Of course, cutbacks in bus service, as contemplated by Southern California Rapid Transit District and the County Board of Supervisors, may well slash ridership. I find it hard to accept that the responsibility for cuts in bus service should be laid to preferential lanes on freeways.

The Times also alleges that "there are more accidents than before."

This is true, but it ignores the fact that the accident trend has been down and that the kind of accidents which have occurred on the freeway since the project began have been of a less serious nature than those which occurred before the project.

In the preproject period, there was an average of 11.5 accidents weekly. In the first week of the Diamond Lanes there were 60 reported accidents, in the second week 39, in the third 28, and since the seventh week an average of approximately 20 per week.

Prior to the project, 30% of all accidents involved injuries. During the project, this share has been 20%. Furthermore, those injury accidents which have occurred have been of a much less serious nature than before the project. Moreover, some of the increase in overall accidents can be attributed to increased enforcement activity.

Let me conclude by making three points:

—Caltrans has invested very little of the public's money in the Santa Monica Diamond Lanes. In fact, we have invested one/570th of the money invested in the El Monte Busway and have obtained the same increase in bus ridership (ridership figures are based on 17 hours of operation of the San Bernardino project versus only 8 hours on the Santa Monica) on these two projects in the same period of time. Yet the busway is generally regarded as a success and the Diamond Lanes are branded by The Times as a "total flop."

—The data which we have made available with regard to this project have been generated and distributed in a straightforward attempt to inform the public, honestly and forthrightly. All our data may be checked against an evaluation to be forthcoming from the SYSTAN Corporation of Los Altos, separately funded and conducted independently from us.

—We have not and are not engaging in any "clever ploys" or "plots" that we have been unwilling to share with the public. The Diamond Lane project was originally planned and presented as a one-year experimental program. It was never expected to achieve all its goals within the first 13 weeks.

Given the massive assault since the start of the project, it has performed remarkably well. As The Times has correctly noted and we have publicly stated on many occasions, people are unlikely to join car pools if it appears the advantage of being in a car pool will be removed at any moment.

Sin and the Diamond Lanes

On the opposite page, Adriana Gianturco, director of the California Department of Transportation, presents her case for continuing the Diamond Lanes on the Santa Monica Freeway.

She doesn't persuade us. We think her main premise is wrong, and we think her conclusions are wrong, too. There's nothing personal in all this; it's simply an argument about the practicalities of a transportation plan.

The faulty premise is that devoting certain lanes on freeways for the exclusive use of buses and car pools—preferential lanes—will cut air pollution and save energy. When these concepts became widespread after Congress passed the Clean Air Act of 1970, they had, in the abstract, a certain appeal.

Since then they have fallen from the weight of both further inquiry and experience. It is now generally agreed by experts on transportation that the use of preferential lanes takes so few cars off the road that the savings in energy and air pollution are insignificant, if indeed they occur at all.

The Times' own recent inquiry concluded that the effectiveness of mass transit as a weapon against air pollution was rapidly dwindling, chiefly because of advances in controlling car emissions.

Tom Quinn, chairman of the California Air Resources Board, does not believe in preferential lanes as a solution to smog, though he grants that they have other uses. He says that progress in cutting car emissions is going so well that by the mid-1980s you'd have to remove half the cars from the roads in Los Angeles to notice any effect at all. That wasn't an exact scientific prediction by Quinn, but a figure of speech to illustrate how much progress is being made, and how little effect preferential lanes will have.

Robert E. Patricelli, the administrator of the Urban Mass Transportation Administration, says there are two reasons for preferential lanes, but they are not smog control or energy conservation—neither of which, he says, is affected in any significant way by the kind of preferential lane in use or contemplated in Los Angeles. (The uses he sees for preferential lanes are helping to make a city work better, and infusing new patronage and hence new money from the fare boxes into urban bus agencies.)

We don't think anyone can seriously dispute the findings of The Times' own inquiry, or the conclusions of Quinn or Patricelli.

We won't rehash our own conclusions from Caltrans' facts and figures about the Diamond Lanes; Ms. Gianturco repeats most of them in her article. We'll just say that we think her article supports these conclusions that we drew from Caltrans statistics:

Air pollution has not been decreased by the Diamond Lanes; the number of passengers carried by bus and car pool is insignificant; there is no prospect whatsoever of increasing either bus or car pool use, and, in fact, the Southern California Rapid Transit District is cutting bus service on the Diamond Lanes for lack of ridership; instead of moving more people faster in fewer vehicles, the Diamond Lanes force the same number of people to move more slowly in roughly the same number of vehicles, and instead of easing traffic congestion, the Diamond Lanes increase it—at 9:30 a.m., when the Diamond Lanes go off, the freeway opens up.

How can we and Caltrans come to such different conclusions from looking at the same situation?

Caltrans focuses too narrowly on the Diamond Lanes themselves. We are glad to see Ms. Gianturco acknowledge that it is looking at the surface-street effects, but Caltrans too often selects figures that tend to make its case. For instance, in talking about whether the total number of vehicle miles traveled has been decreased, Ms. Gianturco apparently confines her figures to the Diamond Lanes alone, ignoring the surface streets.

Caltrans' facts and figures do not by any means tell the whole story.

The blunt truth of the Diamond Lanes is that they make travel in the corridor served by the Santa Monica Freeway slower and more difficult. Anyone except that handful in car pools or on those dwindling buses knows that to get from one point on the corridor to another you have to allow more time than before the Diamond Lanes were inaugurated on March 15. And there is more start-stop traffic, and start-stop traffic creates more air pollution than does more freely moving traffic.

But more is in dispute here than a simple disagreement about interpreting facts and figures.

The heart of the matter is that the Diamond Lanes were created on the premise that the government should force people into car pools by making driving slower and more inconvenient. The Diamond Lanes are the irritating sand in the oyster from which Caltrans hopes to produce its pearl: car pools.

We have no doubt that in an emergency the drivers of the area would make do with car pools as cheerfully as possible, as long as necessary. We would all rearrange our lives. But without an emergency, car pools are of limited value here; travel in this metropolis doesn't flow in corridors as clearly defined as in other cities, but moves between myriad points in a web of almost infinite complexity.

If, then, car pools are less useful here than in other cities, if these preferential lanes will significantly reduce neither smog nor energy consumption, why does Caltrans keep pushing Diamond Lanes?

The answer lies in a purely ideological commitment that pervades Caltrans and some elements of the federal transportation bureaucracy. These public servants are gripped by the notion that Los Angeles' dependence on the car is excessive, and indeed rather sinful. They would teach us a lesson, these latter-day Prohibitionists; we shall be weaned from our dependency, and a little force in the process will do us good. Lest you think this characterization is exaggerated, talk with some of the officials in the state and federal agencies, and count the number of times you hear the pejorative phrase, "Los Angeles' love affair with the car."

As one of the letters to The Times pointed out the other day, it's not so much a love affair as a shotgun wedding, with the federal government's own postwar housing and transportation policies serving as the shotgun.

It's not punishment for our erring ways or puritanical lectures we need, but practical alternatives.

If the Administration in Washington is serious about air pollution and energy conservation, let it stop lobbying in arm with the auto industry for weakening standards for auto emissions; let it start pushing for a tax incentive toward lighter, smaller cars. Let it lend support to the kind of tough stand against smokestack emissions that Tom Quinn's Air Resources Board is pushing here in California.

If Caltrans is serious about air quality and energy conservation, let it abandon at once this Diamond Lane scheme, for it only gives these two exceedingly important causes a bad name.

The government's ultimate power is the power to coerce; it must be used sparingly, with forethought, and only in service to appropriate ends. The Diamond Lane project fails to meet this test.

We favor means to make more efficient use of freeways, and we favor incentives, like park-and-ride lots and subsidized fares and so on, for people to make more use of buses, and, yes, we favor car pools, too, so in theory we should support the experiments Caltrans has planned for other freeways.

But the ideological tenacity with which Caltrans has stuck to the Diamond Lanes in face of the overwhelming evidence of their failure leads us to look with deepest suspicion on Caltrans' other plans. We're afraid that if they also turned out to be naked failures, Caltrans would still insist that the emperor had clothes.

Gov. Brown's office has told us that he has asked for a closer look at the Diamond Lanes. The inquiry shouldn't stop there, but should encompass the other planned experiments as well. Transportation in Los Angeles is too important to be impeded by once-promising but now-discredited theories.

APPENDIX G

TRIAL MATERIAL: HIGHLIGHTS OF WITNESSES' TESTIMONY

Highlights of Witnesses Testimony

John Kilroy

- The PFL wanted to remove the fuzziness that exists regarding EIR's.
- He told of his own observations and inconveniences while driving the freeway.

Zev Yaroslavsky

- He spoke of the increased time, changed pattern of work, and emotional harm to himself caused by the Diamond Lanes. The congestion problem kept him from his constituency in West Los Angeles.
- The existence of controversy was evidence that an EIR should have been produced.
- The submittal of the project to the Los Angeles City Council in the fall of 1975 was, for him, a fait accompli and just a question of whether the city should cooperate.[1]

Sam Taylor

- He spoke of the deterioration of "level of service" (volume to capacity ratio) on surface streets.
- He had predicted an increase in accidents on streets parallel to the freeway for such a project in a June 1974 report.
- He was asked by CALTRANS (Himelhoch) not to try to accommodate increased traffic on city streets; he refused.
- He itemized the changes he made to ease the flow of traffic.

Robert Lunche

- He participated in a lengthy discussion of how photochemical smog is produced, and spoke of the adverse effect on air quality: from auto speed changes; idling on on-ramps; and increased congestion on surface streets, with resulting slower speeds and stop-and-go traffic.
- He stated his opinion, though he had done no analysis, that the Diamond Lane project overall would have a minimal effect on air quality in the Los Angeles area.
- In a letter to CALTRANS (12-4-74), he supported the proposed Transportation Control Plan with reservations about air quality, mentioning the possible effects of changes in driving conditions with preferential lane treatment on freeways, and stating that careful consideration and analysis--such as an EIR--should be done prior to implementation of such projects.

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[1] Although he voted for the City Council resolution on the Diamond Lane in September 1975, Yaroslavsky was never an enthusiastic supporter, and was quoted as saying he had voted for the project "just to see it fail."

Donald Dove	o He traced the history of documentation which resulted in the project assessment as "categorically exempt" from environmental laws and the negative declaration status in 1973 to his own environmental study in 1974. However, both reviews were noted by the Judge as containing the same wording and this fact did not suggest that an independent or second evaluation had been done.
Charles Ford	o He spoke of the project as a state and local program to comply with CAA and EPA rules, separating it from UMTA's data collection and marketing project and from the evaluation program being carried out by a consultant firm, SYSTAN, Inc. o He traced the gradual development and installation of the project over time from early 1973 resolutions of the State Highway Commission to install ramp controls on the Diamond Lane section of the Santa Monica Freeway and subsequent additions, all of which were a part of a Freeway Congestion Improvement Program. The project was evaluated by the environmental branch of CALTRANS but he was uncertain if such evaluation or discussion of environmental effects were a part of the public State Highway Commission meetings when funding was authorized.
Robert McManus	o He described UMTA's interest in funding an essentially educational activity by providing funding for public information, marketing, and data collection (activities local agencies might have given less attention to). o UMTA was interested in the implications of this innovative project (removal of a lane from regular use). The evaluation of information collected locally was to be analyzed by an independent group to insure objectivity and transferability of results at the end of the project. CALTRANS did its own evaluation of the freeway operation as it went on. o UMTA determined that the project was not a major federal action, had no significant impact on environmental quality, and filed a negative declaration in compliance with NEPA. o It was not considered a major federal action because: (1) the Diamond Lane project could have gone forward without UMTA; 2) the temporal nature of the activity (one year); and 3) it was not a major federal commitment like a new mass transit system.

- UMTA's environmental analysis was not a single document but many documents based on information supplied by grant applicants and reviewed by UMTA staff knowledgeable about preferential lane projects. However, while they were not indifferent to the preferential lane operation, UMTA was funding only a study of it.

Charles Boyer
Gary Bork

- The testimony of these two CALTRANS participants in the project was not reviewed, but was reported to be details of the freeway operation, the computer model used, project financing, data produced from the information gathered, CALTRANS transportation control plan and short-term program.

John Burris--

- He described the sampling program set up to monitor air quality in the Santa Monica Freeway corridor.
- The sampling results showed lower CO parts/million, but for a valid comparison, adjustment factors are needed.
- At request of counsel, he did a burden analysis using corridor traffic figures and emission factors based on vehicle mix to estimate tons of pollutants. He concluded thatthe overall pollutant burden was significantly decreased because the total vehicle miles traveled (VMT) was down.
- In 1974, Mr. Dove asked for his opinion of the air quality impacts of the Santa Monica preferential lane. Mr. Burris felt it would produce minimal changes in air pollution in the corridor, but he did not do a study of the corridor.

Paul O'Shea

- Mr. O'Shea was called to testify on the safety aspects of the Diamond Lane project; he gave his opinion on how accidents had occurred, notably by the weaving in and out of lanes, and stated that accidents had stabilized at the 20 to 23 per week range. (CALTRANS' lawyer argued unsuccessfully that accidents were not an environmental matter to be considered under CEQA or NEPA.)
- He stated that increased CHP surveillance would result in some increased reporting of accidents as formulated in the CALTRANS 9-week report, but that this was a small number.

APPENDIX H

MEASUREMENT MATRICES

APPENDIX H MEASUREMENT MATRICES

This appendix contains matrices designed to relate the data elements required for demonstration evaluation to the measurement instruments used to obtain the data. An efficient data collection plan requires that each measurement instrument be used to obtain as many of the data elements as is possible in the appropriate form for evaluation. The objective is to minimize the data collection effort while retaining the prescribed validity. Measurement instrument design is greatly aided by rearranging the measurement instrument data contained in the tableaus of Exhibits 1.5 through 1.9 in a matrix format relating evaluation measurements and measurement instruments. Such a restructuring is shown in the tables which comprise Exhibits H.1 to H.5. These tables are also useful for identifying duplications and omissions in the data collection plans.

The columns on the right-hand side of the matrices denote the measurement instruments, while the left-hand columns contain a listing of the required data elements. The circles in the appropriate right-hand columns define the innovations to which the data element pertains and the measurement instrument used to obtain the data.

To aid reference, data elements have been classified into the following groups:

TRANSPORTATION SYSTEM MEASURES

- Highway System Performance:
  - Productivity
  - Travel Time
  - Congestion
- Transit System Performance:
  - Reliability
  - Travel Time
  - Coverage
  - Productivity

TRAVEL BEHAVIOR MEASURES

- Residential Information
- Trip Information
- Mode Choice Attitudes

SAFETY AND ENFORCEMENT MEASURES

- Accidents
- Enforcement

PUBLIC ATTITUDE MEASURES

ENVIRONMENT MEASURES

- Air Pollution
- Energy Use

EXHIBIT H.1

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
PREFERENTIAL LANE TRANSPORTATION SYSTEM MEASURES	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	TRANSIT & DEMO GRANT RECORDS CENSUS/LOCAL DATA
HIGHWAY SYSTEM PERFORMANCE:																							
PRODUCTIVITY:																							
VEHICLE VOLUME	O																						
VEHICLE OCCUPANCY	O	O																					
VEHICLE LANE CHANGES				O																			
VMT BY FLEET COMPOSITION	O															O	O					O	
PASSENGER MILES BY MODE	O																	O	O				
TOTAL TRAVELERS BY ROUTE	O	O								O													
TOTAL VEHICLES BY ROUTE	O																						
PASSENGER THROUGHPUT PER MILE		O								O													
TRAVEL TIME:																							
AVERAGE VEHICLE SPEED			O		O																		
VEHICLE TRAVEL TIMES			O													O	O	O					

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
PREFERENTIAL LANE TRANSPORTATION SYSTEM MEASURES (CONTINUED)	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	TRANSIT & DEMO GRANT RECORDS CENSUS/LOCAL DATA
HIGHWAY SYSTEM PERFORMANCE (CONTINUED):																							
CONGESTION:																							
ON-RAMP QUEUE LENGTHS	O																						
VEHICLE COUNT IN 5-MINUTE INTERVALS					O																		
VEHICLE MINUTES OF DELAY UNDER 35 M.P.H.					O																		
TIME TO ACHIEVE PREFERENTIAL LANE - BUS - CARPOOL				O																			
PEAK TRAFFIC CONGESTION					O																	O	
SHAPE OF PEAK LANE CONGESTION					O																	O	
TRANSIT SYSTEM PERFORMANCE:																							
TRANSIT RELIABILITY:																							
ON-TIME PERFORMANCE										O	O												
DIFFERENCE BETWEEN SCHEDULED AND ACTUAL TRAVEL TIMES																						O	

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
PREFERENTIAL LANE TRANSPORTATION SYSTEM MEASURES (CONTINUED)	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS RECORDS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	CENSUS/LOCAL DATA TRANSIT [illegible] RECORDS
RIDERSHIP PER DAY AND PER PEAK HOUR										O	O												
TRAVEL TIME																							
TRANSIT TRIP TIME																			O			O	O
DIFFERENCE BETWEEN PREVIOUS AND NEW TRANSIT HEADWAY																						O	O
RATIO OF TRANSIT TRIP TIME TO AUTO TRIP TIME																			O			O	O
DIFFERENCE BETWEEN PREVIOUS AND NEW TRANSIT TRIP TIME																						O	O
ACTUAL TRANSIT VEHICLE IN-SERVICE TRAVEL TIME										O	O												
SCHEDULED TRANSIT VEHICLE IN-SERVICE TRAVEL TIME																							O
TRANSIT COVERAGE (NEW AND EXISTING LINES)																							
ROUTE MILES																							O
TIME OF SERVICE OPERATION THROUGHOUT THE YEAR																							O
DAYS OF SERVICE OPERATION THROUGHOUT THE YEAR																							O
SERVICE FREQUENCY										O	O								O				O
NUMBER OF PERSONS WHO USE SERVICE										O	O								O			O	
SERVICE MARKET SHARE	O																					O	

IMPACT AREA	MEASURING INSTRUMENTS																							
	TRAFFIC DATA					AIR QUALITY DATA				TRAN-SIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA								
PREFERENTIAL LANE TRANSPORTATION SYSTEM MEASURES (CONTINUED)	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS RECORDS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	CENSUS/LOCAL DATA	TRANSIT & DEMO GRANT RECORDS
TRANSIT SYSTEM PERFORMANCE (CONTINUED):																								
TRANSIT PRODUCTIVITY (EXISTING AND NEW LINES SERVICING PREFERENTIAL LANE):																								
NUMBER OF VEHICLES BY TYPE																								O
SEATED VEHICLE CAPACITY																								O
STANDING VEHICLE CAPACITY																								O
NUMBER VEHICLE TRIPS PER DAY																								O
NUMBER VEHICLE MILES PER DAY																								O
NUMBER SEAT MILES PER DAY																								O
NUMBER VEHICLE HOURS PER DAY																								O
NUMBER OTHER OPERATING AND MAINTENANCE LABOR HOURS PER DAY																								O
DEMONSTRATION COSTS IN DOLLARS (FEDERAL, STATE, LOCAL)																								O
DEMONSTRATION OPERATING COSTS PER DAY																								O
PEAK VEHICLE UTILIZATION																								O
EXTENT OF MODAL SHIFT																			O				O	
VMT REDUCTION																			O				O	
PARK AND RIDE LOT USAGE											O													

EXHIBIT H.2

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
PREFERENTIAL LANE TRAVEL BEHAVIOR MEASURES	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	CENSUS/LOCAL DATA	TRANSIT & DEMO GRANT RECORDS
RESIDENTIAL INFORMATION:																								
PLACE OF RESIDENCE (ADDRESS)																	O		O	O				
SEX																	O		O	O				
MARITAL STATUS																	O							
AGE																	O		O	O				
NUMBER IN HOUSEHOLD																	O							
WORKING HOURS																			O	O				
OCCUPATION																	O		O					
DRIVER'S LICENSE																	O			O				
NUMBER OF VEHICLES OWNED																	O		O					
TYPE OF HOUSING																	O							
INCOME																	O		O	O				
RACE																	O							
TRIP INFORMATION:																								
ORIGIN-DESTINATION																	O	O	O	O				
TRIP FREQUENCIES																	O		O	O				

IMPACT AREA	MEASURING INSTRUMENTS																							
	TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA								
PREFERENTIAL LANE TRAVEL BEHAVIOR MEASURES (CONTINUED)	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	CENSUS/LOCAL DATA	TRANSIT & DEMO GRANT RECORDS
TRIP HISTORY	O	O									O						O		O	O				
TRANSIT HISTORY																	O		O	O				
TRIPS BY MODE BY ROUTE																	O	O						
DIVERSION TO NEW TRANSIT ROUTE FROM EXISTING AUTO & TRANSIT BY O/D											O	O					O			O			O	
PARKING COSTS																	O		O					
NUMBER OF CARPOOLERS																	O		O					
RELATIONSHIP OF CARPOOLERS																			O					
CARPOOL HISTORY																	O		O					
NUMBER OF VEHICLES REDUCED																			O					
ATTITUDES ON MODE CHOICE:																								
SITUATIONAL ATTITUDES BY MODE																	O							
CARPOOLING																	O		O	O				
TRANSIT RIDERSHIP																	O			O				
AUTO USE																	O		O					
PREFERENTIAL LANES																	O		O	O				
PREFERENTIAL LANE VIOLATIONS																			O	O				

PREFERENTIAL LANE

SAFETY AND ENFORCEMENT MEASURES

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	TRANSIT & DEMO GRANT RECORDS CENSUS/LOCAL DATA
ACCIDENTS:																							
NUMBER OF ACCIDENTS					○							○											
SEVERITY (PROPERTY DAMAGE, INJURY, OR FATALITY)												○											
PRIMARY CAUSE												○											
DIRECTION OF TRAVEL												○											
TIME OF DAY												○											
ENTERING OR LEAVING PREFERENTIAL LANE												○											
NEAREST INTERSECTION												○											
HISTORY OF ACCIDENTS BY INTERSECTION												○											
ENFORCEMENT:																							
CITED VIOLATIONS OF PREFERENTIAL LANE AND ACCESS RAMPS													○										
OBSERVED VIOLATIONS OF PREFERENTIAL LANE AND ACCESS RAMPS		○		○									○	○									
PROBABLE CAUSE OF VIOLATION (IGNORANCE, CONFUSION, NON-COMPLIANCE)														○									
PERCENT OF ACCIDENTS BY PROBABLE CAUSE												○		○								○	
ENFORCEMENT PROBLEMS OF PREFERENTIAL LANE															○								
POLICE UNIT ASSIGNMENTS														○									

IMPACT AREA	MEASURING INSTRUMENTS: TRAFFIC DATA					AIR QUALITY DATA				TRANSIT DATA		SAFETY & ENFORCEMENT DATA				ATTITUDE & BEHAVIOR DATA							
PREFERENTIAL LANE PUBLIC ATTITUDE MEASURES	VEHICLE VOLUME COUNTS	VEHICLE OCCUPANCY COUNTS	SPEED RUNS	TIME LAPSE PHOTOGRAPHY	COMPUTERIZED TRAFFIC FLOW RECORDS	PERMANENT BAG SAMPLERS	PORTABLE BAG SAMPLERS	RESEARCH VAN SAMPLERS	MOBILE VAN SAMPLERS	POINT CHECKS	RIDING CHECKS	ACCIDENT RECORDS	WARNINGS AND CITATIONS	ENFORCEMENT LEVEL RECORDS	ENFORCEMENT PROBLEM RECORDS	HOME INTERVIEW SURVEY	TELEPHONE SCREEN SURVEY	LICENSE PLATE POSTCARD SURVEY	ON-BOARD SURVEY	PUBLIC RESPONSE MONITORING	MEDIA INFORMATION MONITORING	CALCULATIONS	TRANSIT & DEMO GRANT RECORDS CENSUS/LOCAL DATA
PUBLIC RESPONSE:																							
NUMBER OF FAVORABLE AND UNFAVORABLE MEDIA RESPONSES																						○	
NUMBER OF TELEPHONE COMPLAINTS																					○		
NUMBER OF COMMUTER COMPUTER INQUIRIES																					○		
NUMBER OF QUESTIONNAIRE RESPONSES																	○		○	○			

IMPACT AREA

PREFERENTIAL LANE

ENVIRONMENT MEASURES

MEASURING INSTRUMENTS		AIR POLLUTION:	CO LEVELS	HC LEVELS	NOx LEVELS	ENERGY USE
	TRANSIT & DEMO GRANT RECORDS					
	CENSUS/LOCAL DATA		O	O	O	O
	CALCULATIONS					
ATTITUDE & BEHAVIOR DATA	MEDIA INFORMATION MONITORING					
	PUBLIC RESPONSE MONITORING					
	ON-BOARD SURVEY					
	LICENSE PLATE POSTCARD SURVEY					
	TELEPHONE SCREEN SURVEY					
	HOME INTERVIEW SURVEY					
SAFETY & ENFORCEMENT DATA	ENFORCEMENT PROBLEM RECORDS					
	ENFORCEMENT LEVEL RECORDS					
	WARNINGS AND CITATIONS					
	ACCIDENT RECORDS					
TRAN-SIT DATA	RIDING CHECKS					
	POINT CHECKS		O	O	O	
AIR QUALITY DATA	MOBILE VAN SAMPLERS		O	O	O	
	RESEARCH VAN SAMPLERS		O			
	PORTABLE BAG SAMPLERS		O			
	PERMANENT BAG SAMPLERS					
TRAFFIC DATA	COMPUTERIZED TRAFFIC FLOW RECORDS					
	TIME LAPSE PHOTOGRAPHY					
	SPEED RUNS					
	VEHICLE OCCUPANCY COUNTS		O			
	VEHICLE VOLUME COUNTS					

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