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How the Reconstruction of I-880 Affected Travel Behavior

Joy Dahlgren

**California PATH Working Paper
UCB-ITS-PWP-2001-15**

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The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the State of California. This report does not constitute a standard, specification, or regulation.

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How the Reconstruction of I-880 Affected Travel Behavior

Joy Dahlgren

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HOW THE RECONSTRUCTION OF I-880 AFFECTED TRAVEL BEHAVIOR

Executive Summary

The effect of increased highway capacity on vehicle-miles determines the extent to which increased capacity will reduce delay. But, although there has been considerable study of the subject, the effects of the expectation of development often confound the results, because this expectation causes both growth in travel and increases in highway capacity. The reconstruction of I-880 in Oakland, California ten years after it was destroyed by an earthquake in 1989 provided a rare opportunity to study the effects of a highway capacity increase that was not motivated by increased development, so that the effects of the increased capacity were not confounded by the expectation of increased development.

The effect of increased highway capacity on vehicles miles has important implications for the effects of vehicle automation as well, because such automation is expected to allow much higher vehicle flows, in effect increasing capacity by reducing vehicle headways.

Travelers on this section of freeway were surveyed in June 1999, to determine how the reconstruction had affected their travel and might affect it in the future. Eighty-seven percent of those surveyed believed that the reconstruction saved them time; 17% believed they saved more than 15 minutes. Forty-one percent would have started their trip at a different time, usually earlier, if this section had not been reconstructed. Nine percent said they would consider moving further from their job and 11% said they would consider taking a job further from home as a result of their timesavings due to reconstruction. Seven percent of respondents said they would have used transit if the road had not been reconstructed and 3% said they would not have made the trip at all.

These survey results do not show the high elasticities of demand for travel as a function of capacity increases that are reported in the literature. Rather they indicate that even in this congested region immediately east of the San Francisco-Oakland Bay Bridge, increased capacity can reduce travel times and congestion. Congestion may ultimately reach and surpass its pre-I-880 reconstruction level, but this survey suggests that when that happens it will be the result of economic and population growth in the area rather the reconstruction of I-880.

HOW THE RECONSTRUCTION OF I-880 AFFECTED TRAVEL BEHAVIOR

INTRODUCTION

One of the concerns that people have about expanding highway capacity is that this will motivate more people to travel, so that the highway will soon become as congested as before. This is also a concern with automated vehicles, which would have the effect of increasing capacity.

This so-called induced travel has been a subject of much debate and study in recent years. One of the problems confounding studies of this subject has been that capacity increases are generally motivated by recent or expected development, which generates increased travel and can even increase per capita travel if it increases the size or general prosperity of the metropolitan area. The reopening in 1999 of the section of I-880 that was destroyed by a 1989 earthquake in the San Francisco Bay area provided a unique opportunity to study the effects of a significant highway capacity expansion that was not motivated by development. Because it was out of service for 10 years, people had ample time to adjust their travel patterns to its absence so that its reconstruction represented an increase in capacity rather than the restoration of temporarily diminished capacity.

This study utilized traveler questionnaires to determine how the reduced travel time afforded by reconstruction had affected travel patterns. The paper begins with a discussion of the mechanisms by which increased highway capacity affects travel, followed by a review of the literature on induced travel. Then the survey methodology is described, the results presented, and conclusions drawn.

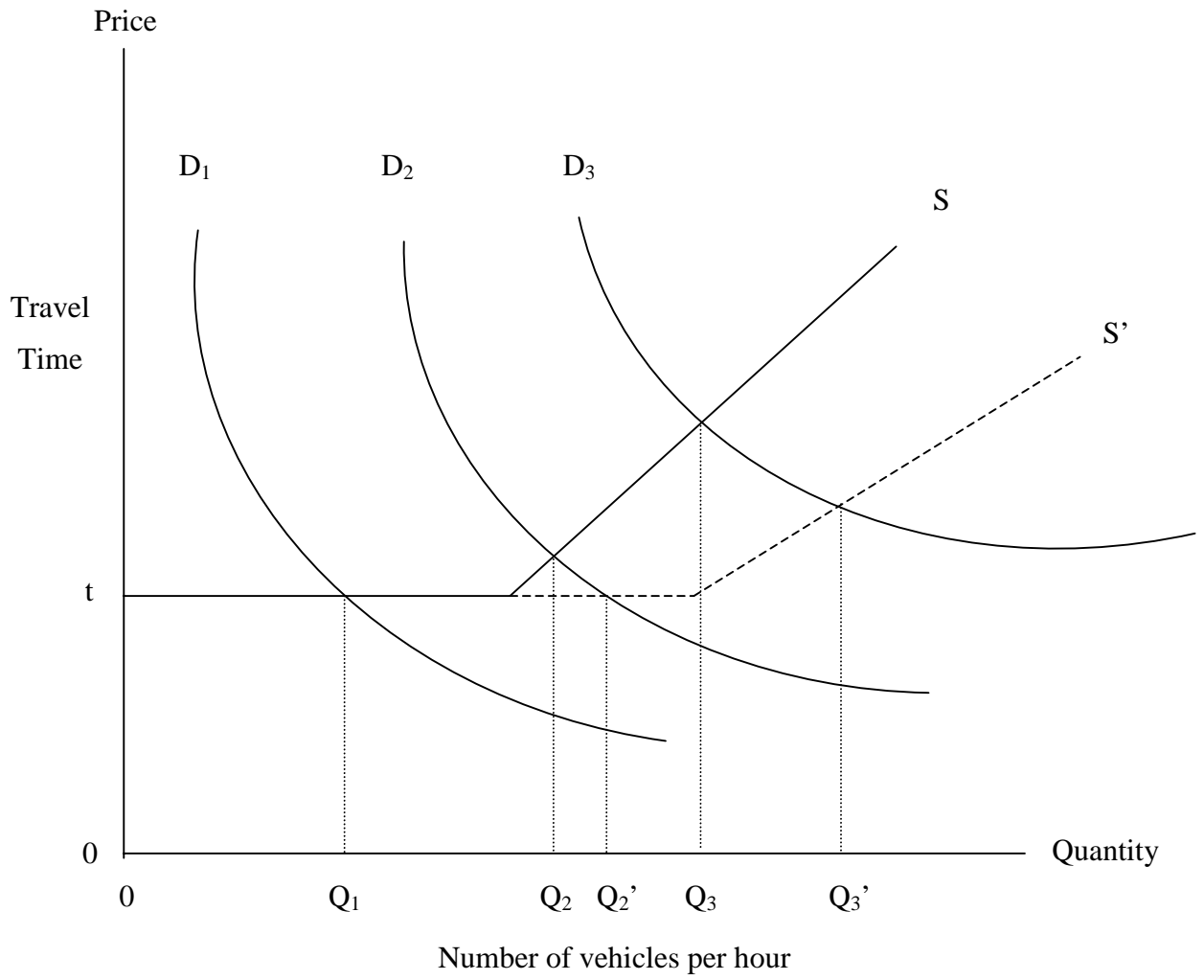
HOW INCREASED HIGHWAY CAPACITY AFFECTS TRAVEL

How Demand, Highway Capacity, and Supply Interact

The demand for vehicle-miles is determined by the value of the activities that can be engaged in as a result of travel. Because it takes time to engage in these activities and to travel on the highways, each individual's travel is limited by the hours in the day. Consequently, the demand for vehicle-miles for a given population, which is the horizontal sum of the individual demands, also has a limit. Figure 1 shows three demand curves, D_1 , D_2 , and D_3 . Because the demand for travel varies over the course of the day there is a different demand curve for each time of day. The supply curve, S , the relationship of highway use to travel time, is horizontal at time t , the time it takes to travel at free flow speed, as long as demand is below capacity. But once demand approaches capacity each person entering the highway must wait for those ahead to pass through the bottleneck ahead of him. If capacity is increased, the new supply curve, S' , shifts to the right, as shown with the dotted line. The effect of the capacity increase on travel time at any point in time depends on the demand at that point in time. If demand is D_1 when capacity is increased, there should be no effect on the amount of travel because the added capacity does not reduce travel time. However, if demand is D_2 then adding capacity eliminates delay, and the number of vehicle-miles increases from Q_2 to Q'_2 . If demand is D_3 , then delay is not eliminated but is reduced so that the number of vehicles increases from Q_3 to Q'_3 . On most highways there is no delay during much of the day, as is the case with D_1 , so adding capacity will not increase vehicle-miles during these times. Only during the congested periods will increased capacity affect the number of vehicles.

Of course, the demand at one point in time is not independent of demand at another time. Many people travel at a less convenient time in order to avoid congestion; they may go to work early or work late. So the vehicle-miles demanded at any particular time of day depend not only on the delay

FIGURE 1 Supply and Demand for Highway Use



at that time, but also on delay at other times and travelers' ability and inclination to substitute travel at another time of day for travel at the preferred time of day.

People who cannot arrive late and do not have time to arrive early may simply decide not to participate in the activity, at least in that particular location. The value of the activity to these people is less than the cost of the travel. So when adding capacity reduces travel time, some people will shift their time of travel to a more convenient time, while others will make new trips.

From these observations we can conclude that the increase in vehicle-miles due to an increase in highway capacity will be greater the more severe and extensive the initial congestion. Furthermore, the first response to an increase in capacity will be a shift of trips from less desired to more desired times of day. But in no case will added capacity, *by itself*, result in more delay. In Figure 1 it is clear that the only way that travel time can increase when capacity is added is if the demand curve shifts, such as from D_1 to D_2 . The demand curve will shift if there is increased activity, which can be due to population growth or increased economic activity.

Findings of Previous Studies

Research shows a strong association between increased travel and increased highway capacity. Fulton, Noland, Meszler, and Thomas (1) conducted a statistical analysis of induced travel in the mid-Atlantic region using county level data and found elasticities of vehicle-miles traveled with respect to lane-miles of 0.2 to 0.6. A 1999 study by Noland (2) based on aggregate state-level time-series data found short-run elasticities in the range of 0.3- 0.6 and long-run elasticities from 0.7 to 1.0. Hansen and Huang (3) conducted a statistical analysis of California county data on state highway lane-miles and vehicle-miles traveled. They found long-run elasticities of 0.6-0.7 for counties and 0.9 for metropolitan areas. However, none of these studies proved that increased capacity was the *cause* of increased travel. It is quite possible that development and the expectation of development drive both increases in vehicle-miles and increased lane-miles.

However, Cairns, Hass-Klau and Goodwin (4) in a study of examples of *reductions* in road space in Europe, North America, and Japan, found that in many cases there were significant reductions in total traffic on the networks studied, showing that reduced capacity can reduce travel.

Fujii, and Kitamura (5) used one-day activity diary data from the Kobe-Osaka area to estimate the effects of two proposed new freeways on travel behavior and found an increase in in-home time and a slight increase in home-based trips.

A round table on Infrastructure-Induced Mobility sponsored by the European Conference of Ministers of Transport in 1996 found that the phenomenon and magnitude of induced traffic is still poorly understood. It concluded "to be able to analyze what happens" when the supply of transport is enhanced "we would have to conduct surveys before and after a new link is opened, with follow-up surveys at a later date."

THE EFFECTS OF THE RECONSTRUCTION OF I-880 IN OAKLAND

The Earthquake and Its Aftermath

In 1989, the Loma Prieta earthquake caused the upper deck of a large section of I-880 in Oakland to collapse and drop onto the lower deck. Although it took less than a year to tear down the damaged roadway, reconstruction took another 9 years because the alignment was changed, requiring acquisition of a new right-of-way, relocation of train tracks and utilities, and a completely new design.

During the ten years that this section of I-880 was out of service, traffic was rerouted to I-580 and I-980. People who had previously used the collapsed section of the freeway, those traveling between points north and west and cities along the Bay south of the collapsed freeway, experienced the most delay, and their increased numbers on the bypass routes increased delay for other people using these routes.

The freeway was opened to all traffic in 1999, but access from the north was restricted by an on-ramp that narrowed to only one lane, causing traffic to back up on southbound I-80 as it entered I-880. This was noted by about 15% of survey respondents. The on-ramp was not widened until after the survey had been completed.

Survey Methodology

On June 18, 1999 a professional survey firm set up video cameras for 12 hours on the reconstructed section of I-880 and photographed license plates of cars passing the cameras. Past experience indicated that in most locations this time period accounts for approximately 80% of total daily traffic. The license numbers were read and entered into an electronic database that was sent to the California Department of Motor Vehicles, which produced an electronic file of the names and addresses of the owners of the vehicles with these license plates. Questionnaires were mailed to a 20% sample of this file, 6,208 registered owners. A mail house produced mailing labels and mailed the questionnaires. Thirteen percent, 822, questionnaires were returned. Figure 2 shows the cover letter and questionnaire.

The 13% return rate raises the possibility of significant self-selection in the responders. Funding for the survey and the need to keep the survey anonymous did not allow follow up interviews of non-respondents to determine how they differed from those who responded to the questionnaire. I speculate that the people who were most affected by the reconstruction, either because they were regular travelers on the route or because it had a significant effect on their travel time, would be the most likely to respond and also to change their travel patterns as a result. People who made only an occasional trip on the route would be less likely to respond. Perhaps also, the people who were most busy would be the least likely to respond; these might be working people. Such potential sources of bias are considered when conclusions are drawn from the survey later in this paper.

General Travel Patterns of Respondents

Travelers were asked to provide information about their most recent trip on the newly reconstructed section of I-880. This section is the darker portion of Figure 3, which shows it in relation to the connecting freeways. Over two thirds of the trips for which respondents provided information were northbound on I-880, the direction experiencing the greatest travel time savings at the time of the survey, and the direction not affected by the on-ramp bottleneck noted earlier. These trips originated primarily in cities along the Bay from San Jose to Oakland and were about evenly split between trips west on I-80 across the Bay Bridge toward San Francisco and trips north and east on I-80 toward Sacramento. The latter were mostly to East Bay cities along the Bay with some trips to North Bay destinations. Of southbound trips on I-880 two thirds were from these locations and one third were via the Bay Bridge from San Francisco, the northern Peninsula and southern Marin.

Table 1 shows the characteristics of these trips. Most of the trips (62%) were to or from work, and another 16% were work-related. Almost a quarter of respondents, 23%, made stops during their trips to pick up carpool members, shop, drop children off at school or daycare, go to the bank, buy gas, get coffee or food, and do other errands.

FIGURE 2 Survey Cover Letter and Questionnaire



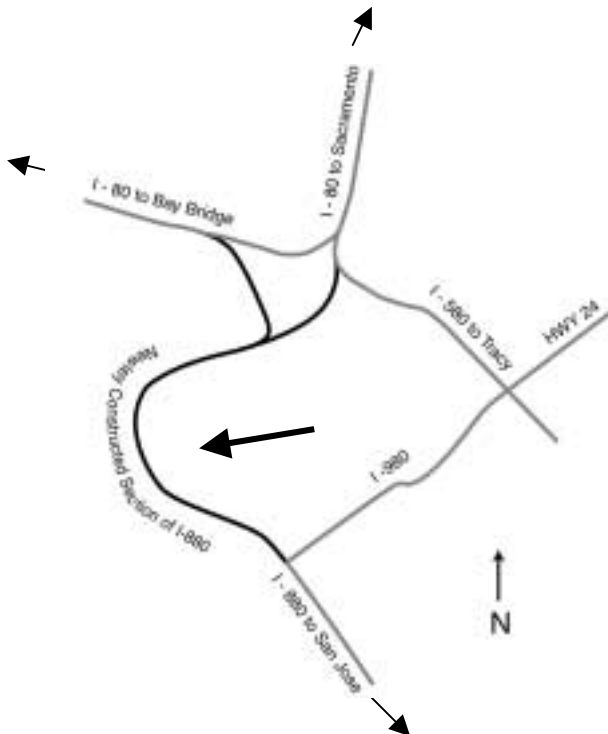
1357 S. 46th Street, Bldg 452
Richmond, CA 94805-4603
June 15, 1999

Dear Bay Area Traveler:

In order to improve the transportation system in the Bay Area, the PATH program at the University of California at Berkeley is conducting a study, sponsored by Caltrans New Technology and Research Program, to determine how the reconstructed Cypress section of I-880 (the dark section in the map below) has affected when, where, and how people travel. If you have used this section of I-880, please help us by completing the enclosed short survey form and returning it in the enclosed envelope within a week. The information you provide will be completely anonymous. Of course, your participation in this survey is voluntary and will not directly benefit you, but by completing the survey you receive the indirect benefit that the study results will reflect your type of travel.

Thank you for your help.

Joy Dahlgren
Transportation Research Engineer
PATH, University of California at Berkeley



University regulations require me to inform you of the following:

Your name and address were obtained by a completely anonymous process. A professional survey firm recorded license plates numbers on I-880. The Department of Motor Vehicles provided a list of addresses of the corresponding owners directly to a mail house that sent the survey to you. All processing of the names was electronic, and no employees of the survey firm, the University, or Caltrans had access to the names. All files containing the names and license numbers have been destroyed. There have likely been some errors in transcribing the license numbers from the video tape on which they were recorded, so you may have received this questionnaire even if your license plate was not observed on I-880.

Recipients of the survey who are under 18 years of age should not return the survey.



Questionnaire

Please tell us about the last trip that you made using the newly reconstructed section of the I-880 freeway (please see the map on the cover letter).

1. Date of trip _____
2. Departure time ____:____ AM / PM
3. Arrival time ____:____ AM PM
4. Trip began near the intersection of _____ and _____ in _____
street street city or area
5. Trip ended near the intersection of _____ and _____ in _____
street street city or area
6. What was the main purpose of your trip? (please check all that apply)

<input type="checkbox"/> 1 to get to or from your regular work place	<input type="checkbox"/> 2 to get to or from school
<input type="checkbox"/> 3 work-related delivery, service, or appointment	<input type="checkbox"/> 4 social/recreational
<input type="checkbox"/> 5 shopping	<input type="checkbox"/> 6 errands/personal business
<input type="checkbox"/> 7 other (please describe) _____	
7. Did you stop at any of the following places during this trip, and if so, for how long?

<input type="checkbox"/> 1 school _____ minutes	<input type="checkbox"/> 2 shop _____ minutes
<input type="checkbox"/> 3 daycare _____ minutes	<input type="checkbox"/> 4 carpool pickup/drop off _____ minutes
<input type="checkbox"/> 5 other (please describe) _____ minutes	
8. Were you part of a carpool during this trip? 1 Yes 2 No
9. Did this trip take less time than it would have before this section of I-880 was reconstructed? 1 Yes 2 No
10. If yes, how much less time?

<input type="checkbox"/> 1 1-5 minutes	<input type="checkbox"/> 2 5-10 minutes	<input type="checkbox"/> 3 10-15 minutes	<input type="checkbox"/> 4 more than 15 minutes
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11. How would you have made this trip if this section of I-880 had not been opened (check all that apply):

<input type="checkbox"/> 1 I would have departed at another time: departure time _____
<input type="checkbox"/> 2 I would have carpooled
<input type="checkbox"/> 3 I would have made the trip via public transit. <input type="checkbox"/> 1 AC Transit <input type="checkbox"/> 2 BART <input type="checkbox"/> 3 Other _____
<input type="checkbox"/> 4 I would have gone to a different destination: destination _____
<input type="checkbox"/> 4 I would not have made the trip.
12. Would you consider taking a job further away from home because of the time you now save by using this section of I-880? 1 Yes 2 No
13. Would you consider moving further away from your job because of the time you now save by using this section of I-880?
14. 1 Yes 2 No
15. How often do you use this section of I-880?

<input type="checkbox"/> 1 4-7 times a week	<input type="checkbox"/> 2 1-3 times a week	<input type="checkbox"/> 3 1-3 times a month	<input type="checkbox"/> 4 less than once a month
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Please use the back of this questionnaire for any additional comments.

Thank you for your help

FIGURE 3 Reconstructed Section of I-880

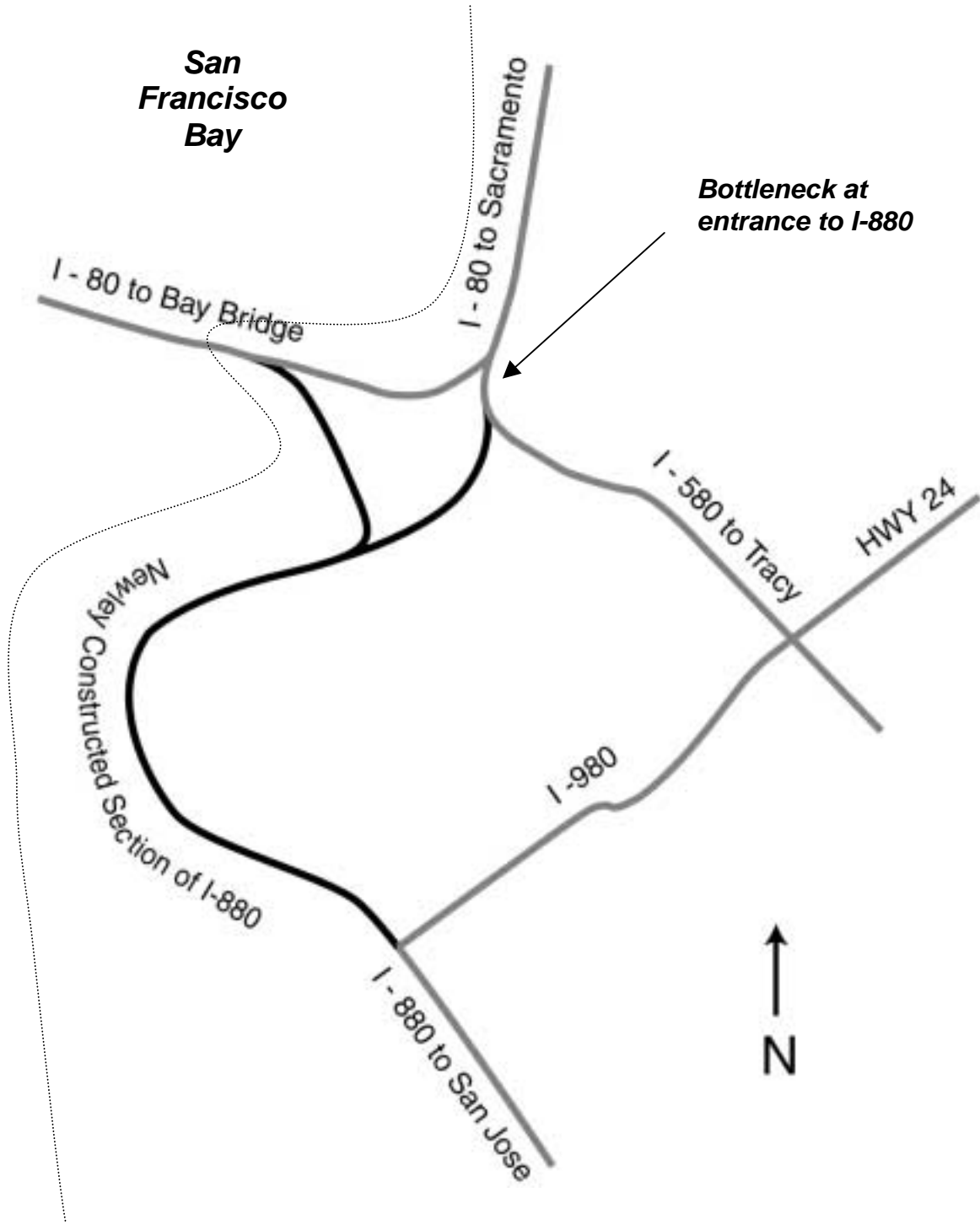


TABLE 1 Travel Patterns of Survey Respondents

<i>Purpose</i>			
Number of responses=802		N	%
Work		496	62
Social/recreational/civic		116	14
Work-related		125	16
Errand/personal business		66	8
Shopping		30	4
Airport		16	2
School		14	2
Total purposes given		863	108
<i>Carpooling</i>			
Number of responses=805		N	%
Carpooled		170	21
Did not carpool		635	79
<i>Day of Week</i>			
Number of responses=768		N	%
Sunday		59	8
Monday		81	11
Tuesday		90	12
Wednesday		163	21
Thursday		163	21
Friday		165	21
Saturday		47	6
<i>Frequency of Use of this Section of I-880</i>			
Number of responses=807		N	%
4-7 times/week		483	60
1-3 times/week		167	21
1-3 times/month		97	12
Less than once a month		60	7
<i>Origin-Destination Patterns</i>			
Number of responses=764		N	%
Northwest bound 880		521	68
	880NW to Bay Bridge W	271	35
	880NW to 80NE	242	32
	880NW	8	1
Southeast bound 880		243	32
	Bay Bridge E to 880SE	79	10
	80SW to 880SE	159	21
	980SW to 880SE	1	-
	880SE	4	1

One-hundred and seventy respondents carpoled, but since questionnaires were sent only to vehicle owners, the actual number of carpoolers in respondent's vehicles is at least twice that. This suggests that there were at least 340 carpoolers out of at least 975 people in these vehicles, so that almost 35% were carpoolers. The proportion of carpools on weekdays was 28% higher than on weekends.

Sixty percent of respondents used the reconstructed section of I-880 more than 4 times a week. Because the likelihood of being sampled is much higher if one is in this group, these people were sampled at a higher rate. They probably account for fewer than 10% of all the people who use the route, but they are the ones most affected by changes in travel time on the route. A third of weekend travelers were also very frequent users.

Figure 4 shows the distribution of travel times on the route, net of any stopover time. The median travel time was 40 minutes, the mean, 53 minutes. Figure 5 shows the departure and arrival times for each weekday traveler, revealing both the distribution of departure times and the distribution of trip lengths at various times of day.

Effects of the Reconstruction of I-880

The reconstruction reduced congestion and travel time by doubling capacity between the intersection of I-980 and I-580 and the intersection of I-880 and I-580. Even when the freeways are not congested, I-880 is faster than the bypass routes, I-580 and I-980, because of its design. The bottleneck at the entrance to I-880 southbound offset some but not all of the timesavings on I-880. Judging from the comments that respondents were invited to include in the survey, many saw this as a temporary problem that would be corrected, as it soon was.

Most travelers reported savings in travel time. These, of course, depended on the initial congestion level at the time of their trips. Figure 6 shows the percentages of perceived timesavings by trip start time. Perceived timesavings were highest between 8 and 9 AM, noon to 3 PM, and 5 to 7 PM. The perception of timesavings throughout the day reflects the fact that the region is congested most of the day. Congestion is often worse on weekends, and weekend travelers as a group perceived greater timesavings than did weekday travelers.

Travelers' Responses to the Reconstruction

The travelers on I-880 were asked how they would have made their trip if the destroyed section of I-880 had not been reconstructed. The most common response was that they would have left at a different time, usually earlier. Seven percent reported that without the reconstruction they would have used transit, and another 3% reported that they would not have made the trip. Nine percent reported that they would consider moving further from work and 11% reported that they would consider taking a job further from home as a result of the travel timesavings.

The level of response differed with the level of timesavings, and the characteristics of travelers differed with different responses.

Responses Depend on Travel Time Savings

Because timesaving is the primary mechanism by which a capacity enhancement influences travel, the responses were analyzed based on the magnitude of the reported timesavings. Table 2 shows the results responses by perceived travel time savings. People who perceive savings of 15 minutes or more are much more likely than other travelers to have departed at a different time, used transit, or not made the trip if I-880 had not been reconstructed. They are also more likely to consider moving further from work or taking a job further from home. Table 2 shows that in general these likelihoods

FIGURE 4 Distribution of Respondents' Net Travel Time

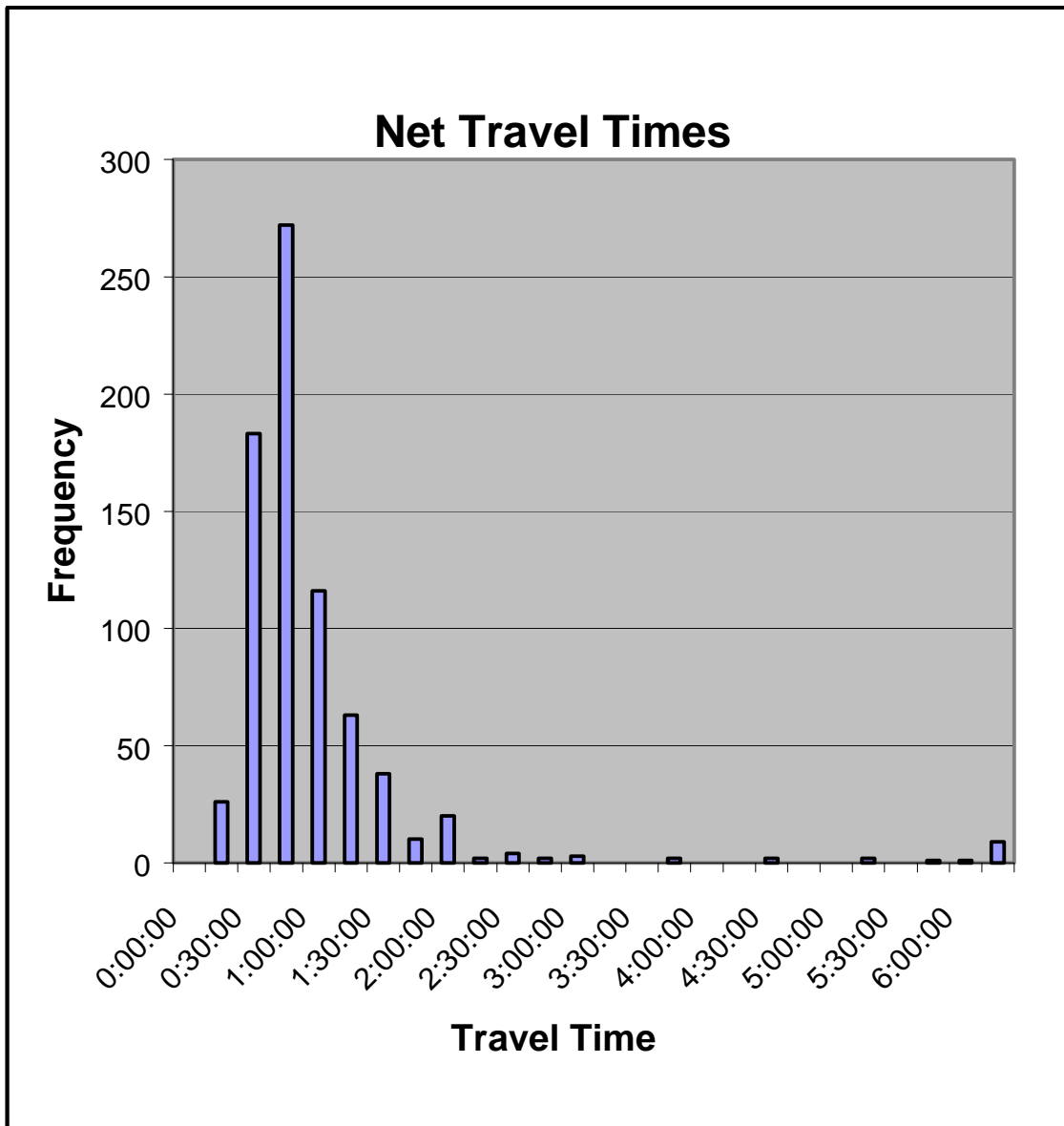


FIGURE 5 Departure and Arrival Times for Weekday Trips

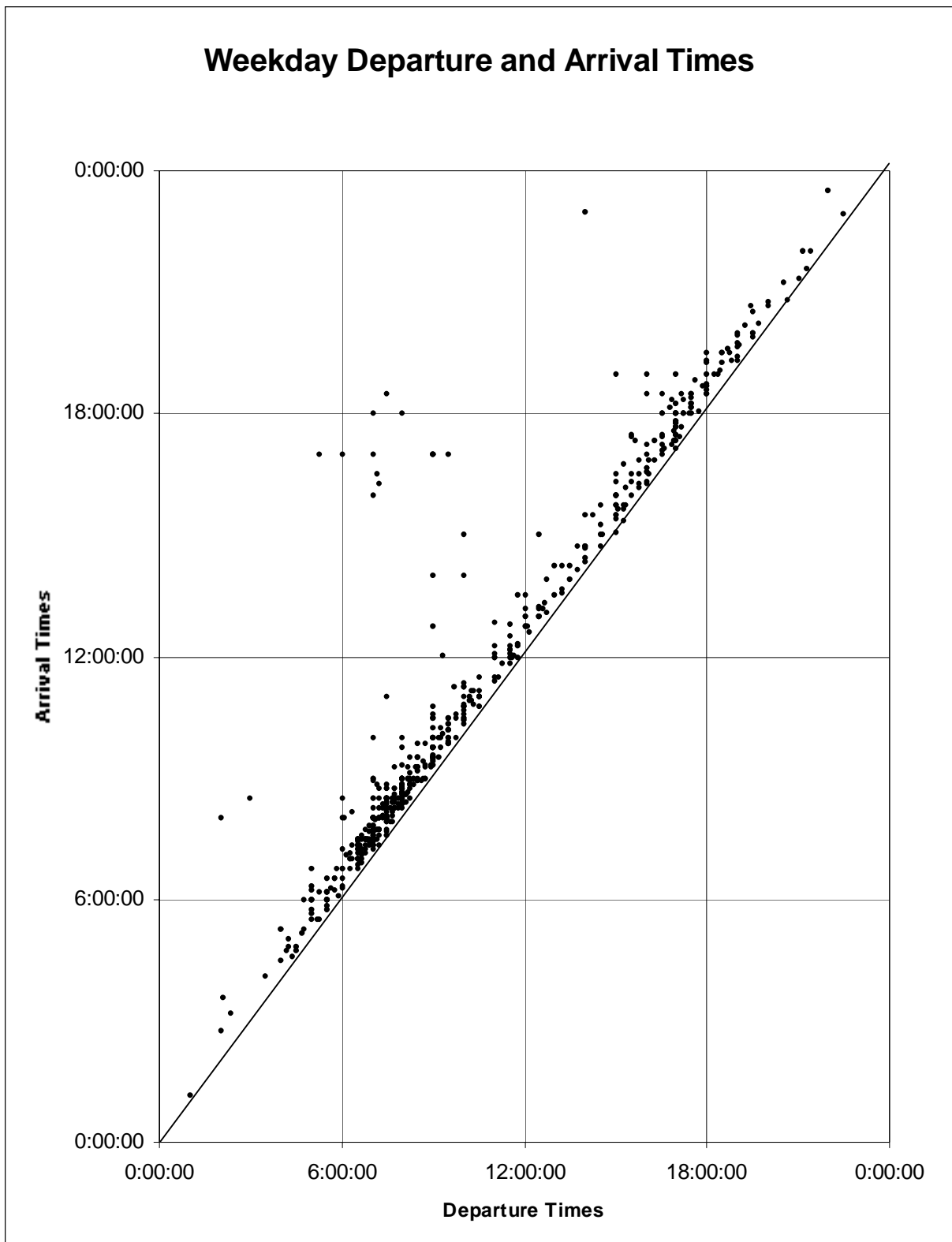


FIGURE 6 Perceived Travel Time Savings

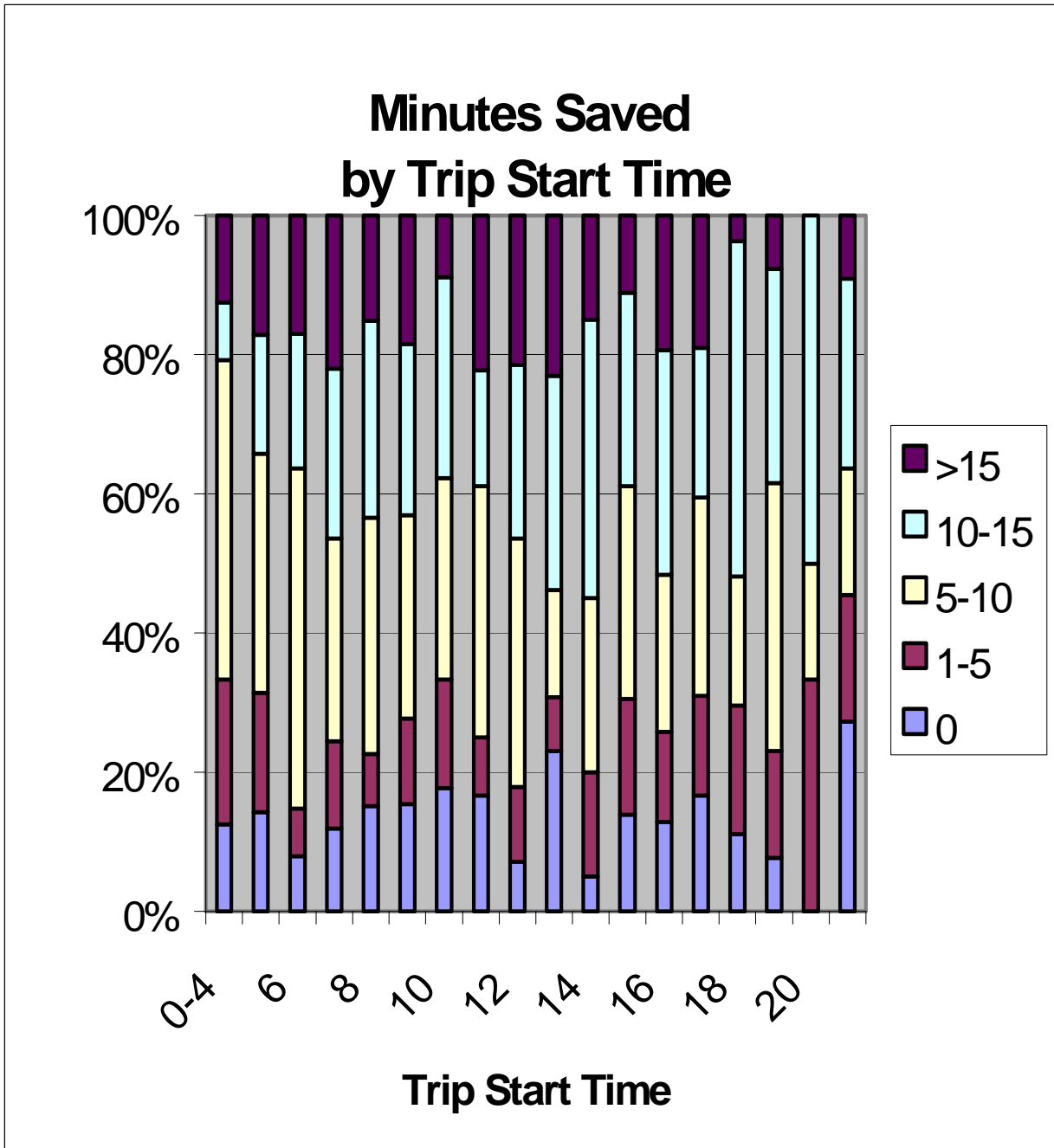


TABLE 2 Influence of Savings in Travel Time on Response to the Reconstruction of I-880

<i>Time savings</i>	<i>Number of responses</i>	<i>Would have departed at a different time</i>	<i>Would have made the trip via transit</i>	<i>Would have carpooled (but did not carpool this trip)</i>	<i>Would not have made the trip</i>	<i>Would consider moving further from work</i>	<i>Would consider taking a job further from home</i>
None	91	29%	3%	1%	2%	7%	8%
1-5 minutes	91	34%	3%	0%	2%	6%	3%
5-10 minutes	219	46%	4%	1%	2%	7%	12%
10-15 minutes	199	42%	9%	0%	4%	10%	13%
More than 15 minutes	125	53%	13%	5%	5%	12%	17%
All respondents	816	41%	7%	1%	3%	9%	11%

increase as timesavings increase. But why do some people who perceive no travel time savings also respond in these ways? One possibility is that they have already traded the potential travel timesavings for a more convenient departure time. For example, suppose a person’s trip before I-880 was reconstructed took an hour if he departed at 7:45 but only 45 minutes if he departed at 7:15, so he departed at 7:15 in order to get to work at 8:30. If it now takes only 45 minutes if he departs at 7:45, he is not saving time, but he does not have to leave for work as soon. Another possibility is that with overall reduced delay the variance in travel time is reduced and so he does not need as much of a buffer. A third possibility is that automobile travel is now less stressful so that he is willing to use the freeway and make trips even if they take the same amount of time, or even to spend a little more time traveling. A fourth possibility, perhaps the most likely, is that people’s memories of trips are somewhat fuzzy and are not necessarily internally consistent.

People Who Would Have Departed at a Different Time

Departing at a different time was the most common response (41%) to the reconstruction. Current departure times for people who would have left at another time, along with the other times are shown in Figure 7. Most of these people (94%) would have left earlier, especially those whose trips started during the morning peak period. This suggests that they prefer to spend the time they save at home rather than at work. About a third would have left around 15 minutes earlier, another quarter around 30 minutes earlier, a fifth 10 or fewer minutes earlier, and about 5 percent an hour or more earlier.

Compared to all travelers these people were more likely to be traveling during a weekday and to be making a work or work-related trip. They saved more time than other travelers, used the route more frequently, and had somewhat shorter travel times. About the same proportion were carpoolers.

People Who Would Have Used Transit or Carpooled

Seven percent of respondents said they would have used transit for their trip had the freeway not been reconstructed. This seems to lend credence to the claim that increasing highway capacity will reduce transit use. However, 30% were carpooling during this trip, as opposed to only 20% of other respondents. Almost 90% made the trip at least once a week. Seventy-eight percent were making work or work-related trips, and their departure times were concentrated in the peak periods, particularly in the morning peak. Their travel times were shorter than those of other travelers, and they reported significantly greater travel time savings.

Only one percent of people who are not currently carpooling said they would have carpooled before the reconstruction. Their numbers are too few to draw any meaningful conclusions regarding the nature of their trips. At the time of the reconstruction, HOV lanes were added to southbound I-80, so the incentive to carpool increased for people entering I-880 from that direction.

People Who Would Not Have Made the Trip

Only 3% of travelers said that they would not have made the trip if I-880 had not been reconstructed. They were more likely than other people to be weekend and midday travelers, and only 53% were making work or work-related trips. They made significantly longer trips than other people and reported greater timesavings.

People Who Would Consider Moving Further Away from their Job

Nine percent of respondents said that they would consider moving further away from their job because of the time they save. Generally they saved more time than did other travelers. But a third were reporting on non-work trips. Of course, not all who would consider such a move will actually make it; 9% would be an upper limit on the number of people who might make longer commute trips because of the reconstruction.

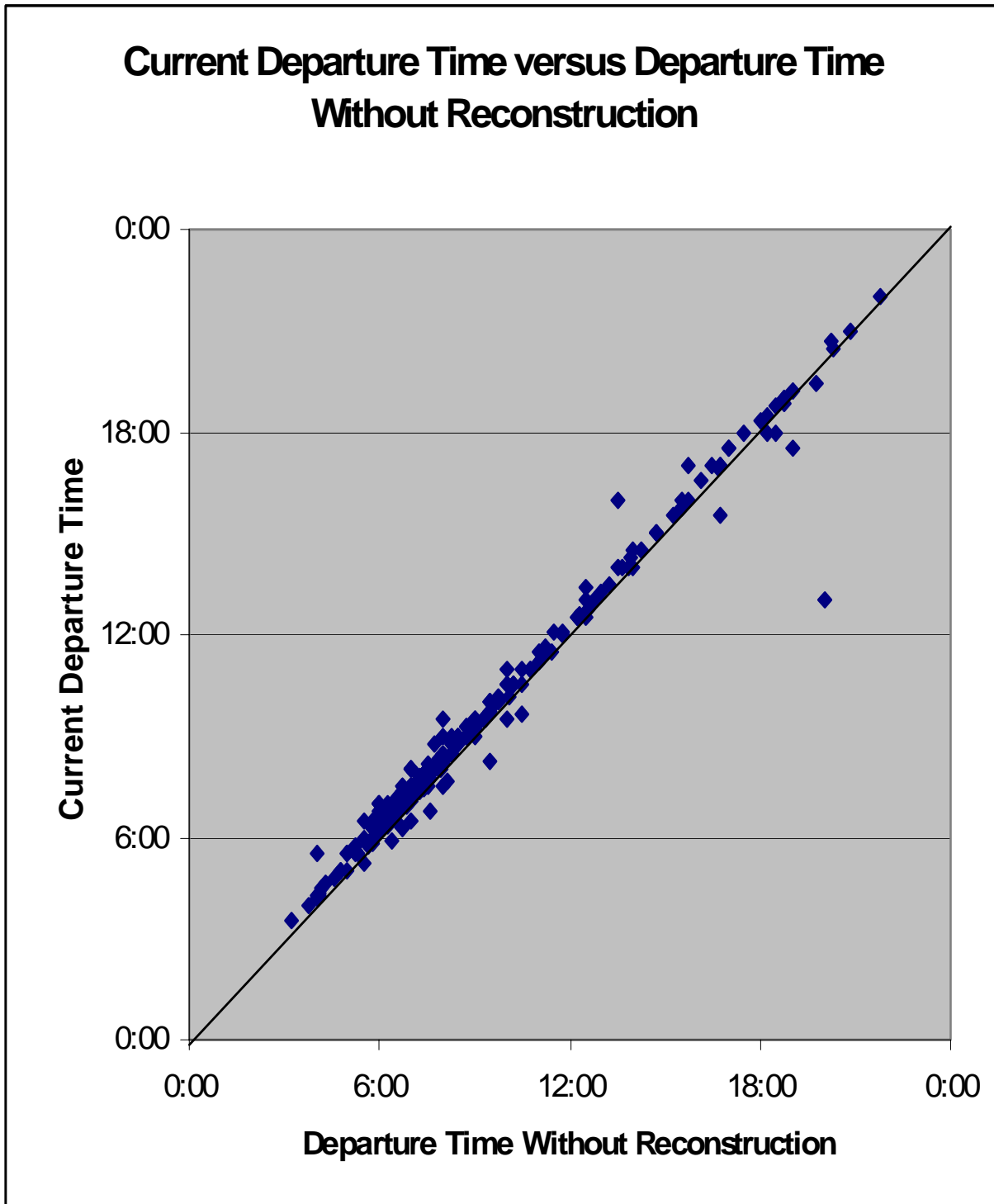
People Who Would Consider Taking a Job Further Away

Eleven percent of respondents would consider changing jobs. They used the route more frequently, but otherwise were not significantly different from other travelers.

Effects of the Bottleneck between I-80 and I-880

A fifth of the respondents reported on trips affected by the bottleneck. They reported smaller travel timesavings than the other respondents and were less likely to have traveled at a different time or used transit had I-880 not been reconstructed, but 76% reported some timesavings.

FIGURE 7 Effects of Reconstruction on Departure Time



CONCLUSIONS

The survey supports the proposition that increasing road capacity, by itself, increases vehicle travel by motivating additional and longer trips and by diverting people from transit. But it suggests that the magnitude of this effect is less than is suggested by the elasticities of demand cited earlier.

Survey Respondents May Respond Differently Than Other Travelers

The survey found that the more frequently people travel and the greater their travel time savings, the more likely they are to consider moving further from work or taking a job further from home. If the speculation that such people would be more likely to respond to the survey than other travelers is correct, then the extent of such changes is likely to be overstated by the survey results. Conversely, people who would otherwise have used transit are probably more likely than other travelers to be carpool passengers. These people were less likely to receive surveys, because the surveys were sent to the owners of the vehicles observed on the road. So the survey results will not reflect the extent of the diversion of *people* from transit, but there is no reason that it should not reflect the number of additional vehicles on the road driven by people previously using transit. The survey found that people who would not have made the trip without reconstruction tend to travel on this route less frequently than do other travelers. If such people are less likely to respond to the survey, then the number of trips that would not have been made without reconstruction will be underestimated. It is possible that some people who would have made a trip using this section of the freeway did not yet know that it was opened. But the numbers of such people would likely be small, since there was considerable publicity regarding its reopening.

Characteristics of the Freeway Network around I-880

I-880 is located in one of the most congested networks in the country. Because the level of induced travel is considered to be greatest in congested networks, it might be assumed that the response to this reconstruction would be greater than the response at most other locations.

Similarly, because there is good transit service in the East Bay corridor and between the East Bay and San Francisco, it might be assumed that more trips diverted would be diverted from transit than in most other locations.

Magnitude of Effects

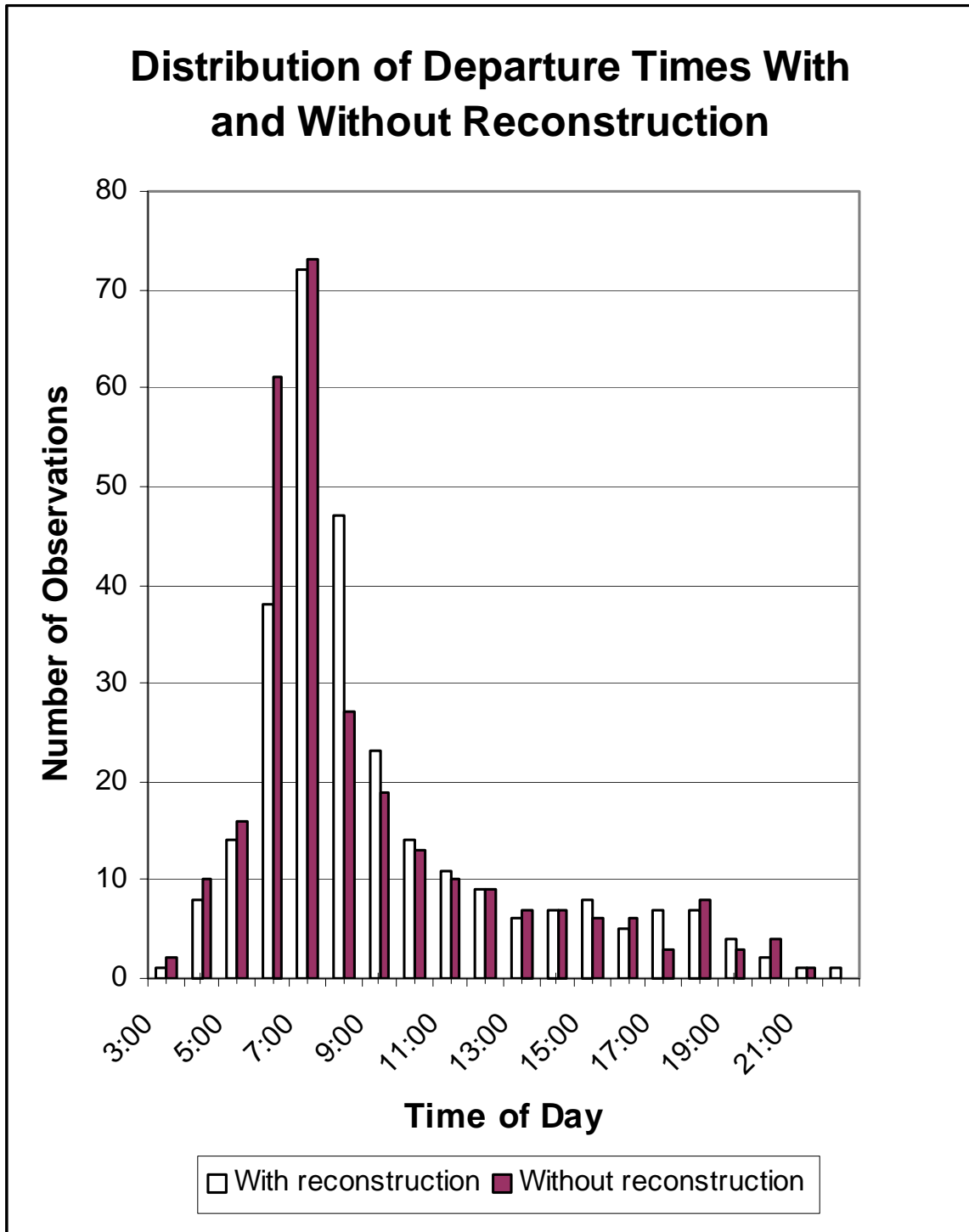
The survey found that 10% of traffic on I-880 was induced traffic. The 7% of induced traffic resulting from shifts from transit was largely concentrated in the peak periods, and so had a more than proportional effect on peak period traffic volumes. New trips may have been underrepresented, but the proportion is small, and even if doubled would not significantly affect the amount of induced traffic. Of course, most trips extend beyond this section of I-880, so vehicle-miles are increased on adjoining roads as well. If some of the people who said they would consider changing their job or housing location because of the timesaving actually made such a change, this would also increase vehicle-miles on adjoining roads (but not on this section of I-880, which these travelers are already using.) The increase would be limited to the number of people who made such changes, probably considerably fewer than 20% of travelers, multiplied by the average increase in their trip lengths, presumably the distance they could travel in the time they saved.

The survey suggests that the perception that freeway expansion does not reduce congestion is primarily the result of people changing their departure times from the shoulders of the peak to the peak, rather than from new trips induced by the expansion. Forty-one percent of all travelers reported departing at a different time than if I-880 had not been reconstructed. By shifting departure times these people tend to concentrate their trips more in the peak. This can be seen in Figure 8.

The departure times with reconstruction are more heavily concentrated in the peak 8-9 AM departure hour than departure times without reconstruction.

The survey indicates that even in this congested region immediately east of the San Francisco-Oakland Bay Bridge, increased capacity can reduce travel times and congestion. Congestion may ultimately reach and surpass its pre-I-880 reconstruction level, but this survey suggests that when that happens it will be the result of economic and population growth in the area rather than the reconstruction of I-880.

FIGURE 8 Departure Times With and Without Reconstruction



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