CORRIDOR TRAFFIC MANAGEMENT FOR MAJOR HIGHWAY RECONSTRUCTION

A COMPILATION OF CASE STUDIES

NOTE TO READER:

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US Department
Of Transportation

**Federal Highway
Administration**

CORRIDOR TRAFFIC MANAGEMENT

FOR

MAJOR HIGHWAY RECONSTRUCTION

A Compilation of Case Studies

September 1986

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INTRODUCTION

This material has been compiled to serve as a background of reconstruction experiences. Included are case studies which document the varied projects and give specific ideas for the management of major highway reconstruction. Also provided in this report are sections on the use of incentive/ disincentive provisions for early contract completion; a summary of ways to expedite expressway and bridge rehabilitation; and a policy statement on the application of traffic management actions. Abstracts and summaries of current literature complete this package as a supplement to the conference.

This material was compiled by the Federal Highway Administration, Office of Planning, for the National Conference on Corridor Traffic Management for Major Highway Reconstruction held in Chicago, Illinois, September 28 through October 1, 1986.

II. CASE STUDIES

SYRACUSE – I-81

SUMMARY OF SYRACUSE 1984 TSM EFFORTS

The upstate City of Syracuse with a population of approximately 150,000, is the business hub of surrounding Onondaga County (population 500,000). Interstate 81 is a major through interstate which runs north-south through the City just to the east of the Central Business District.

By the 1970's I81, planned 30 years before, had reached its capacity limits as a four-lane interstate carrying AADTs of approximately 70,000. In the late 70s, reconstruction work started on some 10 miles to add an additional two traffic lanes as well as the replacement and modernization of three major urban interchanges. By 1984 construction under way in the corridor was well over $100 million. Traffic was maintained on two lanes in each direction for the majority of the time and always on at least one lane in each direction. Nevertheless, significant delays were occurring throughout the construction season. Added to this environment, some 2.8 miles of the narrow three-lane viaduct and adjacent structures carrying southbound traffic through the I81 interchange with 1690 including on- and off-ramps for the downtown business area were slated for major bridge deck rehabilitation and some substructure repair.. The length and narrowness required complete closure to traffic for the major portion of the work.

The project was designed for maintenance and protection of traffic measures that had been standard up until that time. These included detour signing, some flagmen, and signed detours on local streets. The shutdown was scheduled for mid July of 1984.

In May of 1984 the Region became aware of new Federal policies allowing the use of portions of interstate project funding for special traffic system management efforts where the construction impact had severe effects upon the local urban community. With that knowledge, a crash program was immediately instituted in cooperation with FHWA, City and County government, the MPO, police departments, the Central New York Regional Transit Authority, Syracuse and Oswego Motor Lines, and owners of private parking lots in the area to mitigate the closing impacts.

The acronym used for the program was "TOTE" for Total Transportation Effort. Under this cooperative program we had the following in place by the mid July closing:

1. Upgraded traffic signals on 30 city street intersections.
2. Arranged for City Police and County Sheriffs to facilitate the flow and traffic at critical locations.
3. Placed 500 special traffic, information and detour signs.
4. Arranged for 5 park and ride lot locations.
5. Coordinated 6 express bus runs from each lot at 15 minute headways during rush hours.
6. Established high occupancy vehicle lanes for buses, Carpools, and emergency vehicles.
7. Beefed up the MPO's carpooling program to handle the extra load.
8. Printed and distributed 70,000 brochures describing the program.
9. Arranged for 29 newspaper ads in 6 papers and radio spots on 5 stations.
10. Had one major press conference, visited with the Syracuse papers editorial boards and made numerous special radio and TV appearances.

One item not described in the brochure was the high occupancy vehicle lane. After considering its use on the expressway itself along with the possibility of closing one or more major interchanges to other than HOV vehicles, those plans were rejected as causing as much disruption to through traffic and congestion on local streets as the closure itself. Instead, we established an HOV lane on an alternative route which allowed faster alternative travel into downtown for buses and vehicles with three or more persons.

Most of the specifics of the above are best described with reference to the attached brochure which was distributed throughout the downtown and major commuting areas.

The closing of 81 was, in effect, from mid July to late November, and the TSM cost which stayed close to budget was $357,990. The summaries are as follows:

Strategy		Total Cost		Unit Cost
CBD Signal Improvements		$ 14,121		8c/car/day
Police Deployment		73,000		42c/car/day
N. Salina Signal Improvements		11,825		5 l c/car/day*
HOV Lane		100,800		$ 1 .38/car/day
Express Bus Park 'N Ride	Total	74,092	(net cost)	
Centro		38,858		$ 4.48/round trip
S&O		35,235		$ 6.86/round trip
Carpool Service		6,074		$15.00/respondent**
Media		78.078		N/A
TOTAL COST		$357,990		

* Interconnect of signals saved $5,546 because of increased speeds over existing condition during four month period.

**Does not account for persons forming own Carpools as a result of media advertising and those people responding after conclusion of TOTE program who were informed of carpooling via TOTE advertising.

The goal set during program development was to reduce the amount of traffic on mainline I81 during the a.m. peak by at least 10 percent and, in fact, that goal was exceeded with a total traffic reduction of 17 percent.

Public communication through the media, paid advertisements, and the brochure produced the major impact on traffic reduction. The free media, given their never-ending desire to sensationalize events, built up an end of the world scenario for the first day of closure that had the beneficial effect of causing commuters to spread out the a.m. peak time so that traffic congestion that first week was lighter than it had been prior to closure. However, it slowly drifted back into the tighter peak period as summer ended, drivers became aware of less than anticipated delays, and the school season commenced. The first week’s free bus service showed a complementary decline and did not significantly pick up even after a second week of free service was implemented at the start of the school year.

Use of paid radio advertising was effective, especially with the two local stations using traffic reporters flying over the area during the a.m. and p.m. rush hours. In addition to the commercials which were scheduled during those flight periods, they highlighted public attention on the closure and alternatives. The effect of police deployment, except at a few critical intersections, was marginal and as the season progressed, efforts were made to reduce the deployment accordingly.

It was hoped that some of the TSM efforts would have positive long-range carry over effects including a continued spread of the rush hour peaks, more use of transit and carpooling. The most substantial lasting benefit was the improvement in traffic signals on local heavily trafficked streets which will continue to serve the public for the foreseeable future. Long-term transit use was disappointing, as it not only tapered down during the closure period but had little residual effect. Similarly, the Park and Ride lots, most of which were left signed and in use, now serve only a very limited number of commuters.

Public awareness of the project and use of the alternatives presented was a major success which had the additional effect of very favorable acceptance of the project, its need and the necessity of reducing traffic service during construction.

Looking back, considering cost effectiveness, I would subjectively rate the priorities in terms of effectiveness as follows:

1. Open and frank discussion with the media prior to closure aided by paid commercial media advertisements.
2. Traffic signal improvements on local streets.
3. Additional transit service in conjunction with outlying park and ride lots.
4. Some of the police deployment.
5. Use of the HOV lane.
6. Expanded carpooling service.

PHILADELPHIA - SCHUYLKILL EXPRESSWAY

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

SCHUYLKILL EXPRESSWAY IMPROVEMENT PROJECT

TRAFFIC MITIGATION MEASURES

and

PUBLIC INFORMATION PROGRAM

Werner Eichorn, Asst. Dist. Traffic Eng.

Lois M. Morasco, Asst. Press Secretary

Background

Originally designed as one of a network of expressways ringing the metropolitan Philadelphia area, Interstate 76, -- or as it is more commonly referred to -- the Schuylkill Expressway -- was fully opened to traffic in 1961, ten years after construction began. In the ensuing 25 years, I-76 also was to stand virtually alone as almost all of the remaining proposed highways were dropped because of community opposition.

For most of its 21-mile length from the Pennsylvania Turnpike in Montgomery County to the Walt Whitman Bridge in Philadelphia, I-76 is mostly a four-lane, limited access highway, with some short stretches of six or eight lanes. Link volumes run between 80,000 to 143,000 vehicles a day. Much of the highway passes through difficult terrain composed of steep rock cuts, high embankments and wide, deep gullies. These restrictions, along with other constraints imposed by an adjacent railroad, parkland, and residential properties, are responsible for the variation in width and lack of progress on the part of the State Department of Transportation to provide additional expressway capacity through widening.

From about the mid '70's, it became obvious that both the expressway pavement and the bridges in the 17.7 mile section between the Turnpike and University Avenue in Philadelphia were rapidly deteriorating, making any further interim remedial action ineffective. Of the 50 bridges within these limits, 38 required redecking including the 1500-foot Pencoyd Viaduct which crosses a Conrail freight line and the Schuylkill River.

Because of the importance of the highway to the region and the fact that the rehabilitation could be delayed no longer, Secretary of Transportation Tom Larson committed the Department to reconstructing the expressway as quickly as possible with the least amount of disruption to the motorist.

Keeping Traffic Moving

Planning complex traffic strategies for major rehabilitation projects is not a new role for PennDOT. Responsibility for 44,000 miles of roadway and more than 25,000 bridges has provided ample opportunity to utilize construction and traffic management techniques over the last 12 years.

The challenge of the Schuylkill Expressway project was to provide sufficient off-expressway capacity on the local road system to handle the traffic expected to divert when construction started, as well as to maintain an acceptable level of on-expressway movement while the work was underway.

The Department realized that the impact of the projected work on the region would be disruptive not only to the more than half a million daily users of the expressway, but also to the communities adjacent to I-76, and to the local transportation system. The latter faced a two-fold dilemma: it would need to find additional capacity on trains and buses to carry the expected increase in passengers, and it would have to revise its schedules to reflect delays of its buses which used both the expressway and the local street system.

A project liaison engineer was named to coordinate the various aspects of the improvement project, from planning and design to trouble shooting during construction. The Department also contracted with the traffic engineering firm of Orth-Rodgers & Associates, Inc. of Philadelphia, to plan the off-expressway strategies required to handle the diverted traffic. To gain insight into the problems likely to be experienced by the affected communities, and to get support from businesses, agencies, and other organization and groups who had an interest in the project, the project manager also put together a Task Force to help plan the traffic management for the off-expressway improvements which would be needed. The Task Force was composed of 14 municipal governments (including the City of Philadelphia), the local transit authority (SEPTA), the Delaware Valley Regional Planning Commission, the Keystone/Triple A Club, the Pennsylvania State Police, four local chambers of commerce, a para-transit association, and two traffic reporting services.

To start the planning process rolling, Orth-Rodgers initiated a five-task work program providing for:

1. establishing and analyzing the existing transportation situation;
2. developing expressway reconstruction strategies;
3. evaluating the impact of the recommended reconstruction strategies on the region's transportation network;
4. developing and designing the Traffic Management Plan;
5. monitoring the effectiveness of the Traffic Management Plan.

0 & D Survey

Under Task 1 of the work program, a detailed inspection was made of the expressway ramps and the mainline structure, and an Origin and Destination Survey was taken of peak period expressway users. In addition, studies were made for travel time on 15 corridors running parallel to the expressway; automatic traffic recorder and manual-turning movement intersection saturation flow; vehicle classification counts; on-street parking; intersection/corridor capacities; delays and level of service; and a physical inventory of 250 traffic signals.

The 0 & D Survey consisted of a pre-addressed, postage-paid postcard questionnaire. Six questions were asked to determine the entrance and exit used by the respondent, where he/she was coming from and going to, and the occupancy and type of vehicle. The final question asked what the respondent would do, given certain choices, if expressway driving became too inconvenient during construction.

Of the 37,000 cards distributed, 14,000 -- or 38% -- were returned, a response rate indicative of the keen public interest in the rehabilitation project. Among the survey findings were that the average vehicle occupancy was 1.45 persons, three out of four vehicles,contained a driver only, and 17.5% had only one passenger. While 80% of the respondents indicated they would change their travel habits, 60.3% said they would divert but continue to drive, 10.8% said they would use public transportation, and 2.2% said they would join a Carpool.

The survey also revealed that the expressway trips were relatively short, averaging 5.5 miles. Also of particular interest was that only 18% of all users had a trip destination in Center City Philadelphia, indicating that there were no concentrated travel patterns and that the resultant desire lines involved the entire region. These findings were especially important to developing Task 2, the reconstruction strategies.

The Strategies

The construction staging and the duration of the work were dictated by the 50 structures and the complexities of two of them: the Pencoyd Viaduct, and the Vine Street Interchange, both of which required longer phasing.

The Task Force, using the survey results and the construction phasing requirements, decided on a three-year construction schedule that would involve a total of five sections. Most of the work would be done in the second construction season. They also defined three traffic related goals to be followed as the strategies for the on-expressway portion of the Traffic Management Plan was developed. They were:

First, maintain at least one lane of traffic in each direction at all times in the construction areas.

Second, encourage trucks, tourists, and other long-distance travelers to remain on the expressway during construction.

Third, reopen all lanes of traffic from approximately November through February. This third goal was later modified when it was determined that the redecking of the Pencoyd Viaduct could be done in one season if started several months earlier than the March 1 start date.

Probably the key to achieving the desired 50% reduction of expressway traffic during the morning and afternoon peak periods was the decision to limit the local driver's access to the highway by closing certain ramps. Selecting which ramps to close was based on the following criteria:

1. On-ramps leading into a construction zone where only one lane was open.
2. If the ramp had a bridge which needed rehabilitation.
3. If the ramp was blocked by a construction operation.
4. If the ramp by remaining open encouraged more than the optimum number of drivers to use the expressway.

The final decision was to close a total of 46 ramps, most of them on-ramps, over the three-year construction project. With this important decision made, the traffic consulting firm approached Task 3, the problem of reassigning the traffic which would be diverted from the expressway onto the local street system either by choice or by necessity.

Mitigation Measures

The most recent development in the area of traffic control for'construction projects is the Department's ability to program improvements on detour routes.

These mitigation measures can be used either to correct existing capacity restraints; widen to increase capacity for the anticipated traffic movements; modify phasing, timing and coordination of traffic signals; or improve public transportation facilities and service. In the case of the Schuylkill Expressway, all of these measures were used.

Because of the presence of the expressway, improvements to many alternate routes had been negligible, either because of other priorities or an insufficient benefit cost ratio. As a result, the adjacent road system was not prepared to take on the added burden of diverted expressway traffic.

The Task Force was instructed to develop a "shopping list" of potential improvements for the diversion routes and the public transportation system. This process involved some 30 meetings of the Task Force members with an evaluation of the proposals provided by Orth-Rodgers under Task 3 of its five-point program.

The Traffic Management Plan developed was based on the "shopping list" and budgeted at $12 million. It contained the following generic categories of improvements:

1. Traffic Signals (coordination, timing or phasing changes, new or modernized signals and temporary signals)
2 Roadway Construction (minor widening, turning lanes, on-street parking replacement)
3. Emergency Restoration (immediate repairs to key diversion routes)
4. Transit (parking lot expansion, additional buses to maintain headways in increased traffic, additional rail cars to increase ridership, extension of rail service beyond the exiting terminus

5. Ridesharing (increase regional ride sharing efforts in Schuylkill Expressway corridor)
6. Traffic Control (assign traffic control officers to key intersection and school bus stops)

To implement the above, two contracts totaling $1.3 million for roadway and signalization work were let in 1984 in anticipation of the 1985 expressway construction. A combined roadway and signalization project for $2.6 million was let in 1985 for off-expressway improvements required for the 1986-87 expressway construction.

Outside the 29 temporary signals, all of the improvements under these three contracts were permanent.

In evaluating proposals of this type, it is important to favor acceptance of even marginal improvements in order to have a system flexible enough to adjust to traffic demand. This rationale is based on anticipated diversions and certain assumptions which may or may not prove valid.

Also of considerable benefit was the Department's extensive file of existing traffic volumes on its non-primary routes. This file provided the basis for the evaluations during construction to see if complaints were in fact the result of expressway diversions.

In addition to the contractural work, emergency restoration consisting of mechanized patching was performed by Department maintenance forces on four corridors. This was done by accelerating the maintenance schedule for those roads tagged as possible diversion routes.

Transit improvements included parking lot expansions at three locations, an extension during peak travel hours of the Paoli Local train service to Downingtown, and supplemental service for expressway bus routes. The result of the added train service was 1,300 more passengers riding the Paoli to Downingtown extension. The supplemental bus service enable SEPTA to provide the same frequency of service as before the start of construction despite delays of up to 35 minutes caused by the required detour routings, and minimized the impact on some 6,000 bus users per weekday.

The Delaware Valley Regional Planning Commission stepped up it "Corporate Outreach' program to promote Vanpools and ridesharing during the reconstruction project and contacted close to 1,000 companies. This effort was supplemented by speeches at business meetings, direct mail, PSA's, news releases, and interviews.

Of the 5,016 requests "for matches" in 1985, 3,206 were attributed to the expressway reconstruction and more than half of those calls were received in the first four months of the year. Similar results were achieved in 1986. The increased workload was handled by adding telephone lines to the CAR POOL toll free hotline and hiring one part-time employee during the first quarter of each of the two years.

Funds to pay for manual police control were allocated in the expressway construction project budget. Agreements were entered into with the various municipalities on hourly police compensatory rates when this service was required. Certain key intersections and school crossings were selected for police protection in advance of the start of construction. The ability to be able to immediately place a police officer at specific locations when needed allowed the Department to quickly respond to problems until other measures, such as installing temporary traffic signals or changing the timing of a traffic light, could be taken.

Three contracts totaling $13 million also were awarded in 1984 and 1985 to prepare the expressway for handling two-way traffic while the reconstruction was underway.

The first was a $2.5 million contract to improve the shoulder and concrete safety barrier along a six-mile section of the expressway. The contract also provided for correcting slope erosion and improving the drainage.

During the 1985 construction season while the eastbound lanes were being rebuilt, the upgraded shoulder and the westbound left lane handled the two-way directional traffic, with a safety lane provided in between.

The second contract was for $7.4 million and covered a five-mile area; in addition to the shoulder upgrading, it included building a concrete box culvert to replace an existing steel bridge over a railroad.

The final contract was for $3.2 million for a three-mile section of expressway and included improved lighting in the Philadelphia section of the City Avenue Interchange.

While this preliminary construction work was going on, traffic on the expressway was maintained, except for certain exceptions made in the off-peak hours.

Traffic Monitoring

Prior to the start of the expressway project, the Orth-Rodgers consultant team took counts both on I-76 and on the alternate route system which provided the basis for determining where the traffic had gone. During construction, the consultant did a series of manual and automatic traffic counts as part of its on-going monitoring analysis of the on and off-expressway traffic patterns.

The counts were taken in the peak commuting periods, 6 a.m. - 9 a.m. and

and 3 p.m. - 6 p.m., at key locations on the expressway and along the diversion routes. Speed and delay runs on the expressway were used to identify problem areas.

Quick identification of the problems by the consultants, and an equally rapid review and decision process in the Department's Traffic Unit, were important factors in the Traffic Management Plan. In the first several months after the construction start-up, adjustments for left-turn phasing, retiming of signals, and the addition or removal of a temporary signal were frequently made in order to improve traffic flow.

Interestingly enough, the need for auxiliary police for the off-expressway diversion routes was not as frequent, nor as extensive as originally anticipated, attributed in large part to the wide dispersal of the traffic and the effectiveness of the revamped signalization.

Construction interference with the traffic movement on the expressway was kept to a tolerable level through Department efforts to make the contractors responsible for advance warning of any added restrictions. The Traffic Unit approved the type of restriction and the times it could be in effect. Peak hour restrictions were kept to an absolute minimum and approved only under unusual circumstances.

To give the Department leverage in controlling the on-expressway traffic disruptions required by the contractor, the following was included in all the contracts under the title, "Advance Notice of Traffic Restrictions".

"Notify the engineer at least four calendar days in advance of the start of any operation which will affect the flow of traffic and provide the engineer with details of the work to be done. After notification, the District Office will advise the public of these traffic restrictions and possible delays.

Motorists were then given sufficient warning through the various mechanisms set up under the Public Information Program and had the opportunity to choose an alternative in order to avoid the added delay. As a result, unusually long and enduring backups rarely materialized.

Lastly, breakdowns and accidents on the expressway in the construction zone were handled by towing services which were hired by the general contractors for each of the construction zones. The service was provided free, 24-hours-a-day, seven days a week for the duration of each contract. It added inmeasurably to maintaining the traffic flow through the construction areas.

Informing the Public

The data derived from the Origin and Destination Survey was not only of value for planning the maintenance of traffic during construction but proved very useful in putting together the Public Information Program which was the responsibility of the Press Office. Among the most significant findings in the survey was the fact that 80% of the expressway users indicated they would change their travel habits during the construction. One of the Public Information goals was to provide this group with information that would help at least half of them do just that.

In the early planning stages of the project it became apparent that hardly anyone but PennDOT wanted the reconstruction to take place at the time. Both business and government viewed the proposal with considerable misgivings, convinced the reconstruction would totally disrupt the only major east-west traffic movement between city and suburb and play havoc with the areas' economy,

The suggested alternatives ranged from the impractical -- such as - waiting to complete several new expressways which were still on the drawing board -- to the impossible, which included the suggestion to build an expressway on top of the existing one.

To address these concerns, the Press Office in putting together the Public Information Program also listed among its goals the need to allay the fears that the reconstruction would " shut down" the City of Philadelphia, make it impossible to get anywhere, and frighten the tourist away.

Based on the 0 & D information, the audiences targeted to receive the information that would help them either cope with the construction or avoid it were divided into two major groups:

1. the visitor (or tourist) and trucker
2. the commuter and occasional local driver

Because of the lack of a good parallel route or another expressway, it was not practical to try to divert the tourist, trucker, and other long distance users from I-76, and they were encouraged to stay on the expressway. Conversely, the commuter and the occasional local driver had numerous options open to them, and they were encouraged to choose an alternative to I-76 during the reconstruction.

To accomplish this, the 1985 and 1986 Public Information Program provided for:

1. A Visitors' Guide for each of the first two construction seasons. It was directed at the trucker, tourist and other long-distance traveler, and was designed to encourage them to stay on I-76.

2. A Commuters' Guide for each of the first two construction season. A more comprehensive brochure, this guide detailed ramp closures and detours, alternate routes, and other ways of making commuting easier.

(In 1987, when, over 90% of the work will be completed, the Visitors' and Commuters' guides will be combined into one.

3. Mail House which prepared a special mailing list comprised of tourist bureaus, travel agencies; trucking associations, convention centers, hotels, automobile clubs, chambers of commerce, corporations, service organizations, cultural and sports institutions, medical centers, and hospitals, colleges and universities, and government and elected officials. The list received the brochures and other special mailings.

4. Stationery to give the project its own identification was designed.

5. Three Public Service Announcements were produced initially, with two additional PSAs budgeted for, if required. The first two PSAs were completed in time for the kick-off press conference on January 17, 1985.

6. A Toll Free Hotline was set up at the Department's district office in St. Davids so that the Press Office could oversee the operation. Operators provided alternate routings for callers. Other duties included answering questions about the construction, taking complaints for forwarding to the Press Office, and sending out information.

7. Other public relations tools used included press conferences, news releases, radio and television interviews, and special media events.

Planning the Public Information Program took approximately a year although publicity on the project had been on-going since 1982. The major thrust of the publicity focused on the distribution of the guides and took place over a 12-week period preceding the start of the permanent traffic restrictions.

The long-range planning for the expressway rehabilitation, the mitigating traffic measures -- including the monitoring during construction -- and the largest public information program ever undertaken by the Department for a construction project, combined to make the expressway project a success.

No massive traffic jams materialized, life went on in the City of Philadelphia, the tourists came as usual, and the region's drivers proved that given choices and information they could be quite resourceful and successfully cope with a major reconstruction project.

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ATLANTA - REGIONAL HIGHWAY RECONSTRUCTION

A CASE STUDY OF ATLANTA FREEWAY SYSTEM RECONSTRUCTION

Presented to

TRANSPORTATION RESEARCH BOARD CONFERENCE

ON RECONSTRUCTION OF URBAN MAJOR EXPRESSWAYS

SEPTEMBER 29, 1986

by

Alton L. Dowd, Jr.

Slide 1

Title

Slide 2

Transportation was Atlanta's genesis which began only 153 years ago in 1933 when a railroad surveyor named Stephen Long drove a stake to locate the intersection of two railroad lines, one south from Chattanooga and the other west from Augusta. Mr. Long predicted that no great town would go around this railroad terminus, just a blacksmith shop and a country store.

Slide 3

This historical marker now locates the intersection in underground Atlanta very near Five Points, the heart of downtown Atlanta, Georgia.

Slides 4 and 5

Stephen Long's predictions have proven very short of reality just as have many subsequent growth predictions for the City of Atlanta.

Slide 6

The railroads dominated Atlanta's early development and severely restricted its street pattern. This early map slide shows the original rail lines in red. There is also a rail corridor or circle completely around the central business district with very few major street crossings.

Slide 7

The original freeway system in Atlanta did not begin until 1946 with the completion of a report by H. W. Lochner & Company and DeLeuw Cather & Company on transportation needs. This report recommended an expressway system which is the current core of Atlanta's existing freeway network. The reconstruction of this freeway system was well underway by 1955. In 1956 with the passage of the National Interstate Act, the partially completed expressway system was incorporated into the Interstate Highway System. The roadways built prior to the Interstate Act were financed with bond funds sold by the City of Atlanta, Fulton County, with the Georgia State Highway Department sharing in the construction cost. After 1956 the system was largely financed with Interstate Highway funds.

Slides 8, 9, 10, 11, 12

The early freeways used the state of the art at the time, but did not avoid poor alignment, steep grades, no acceleration lanes, deceleration lanes, or inside lane drops.

<u>Slide 13</u>

The freeway system in Atlanta was completed in 1967. There was not any additional work done on the system until 1978. There was an attempt in the mid 60's to eliminate a major flaw in the original system. That flaw was the combining of two freeways, Interstate 75 and Interstate 85, into a common roadway through downtown Atlanta. A new route was proposed through the east side of Atlanta, called Interstate 485. This route went through the Morningside residential community and environmental court suits resulted because of the new environmental protection laws in the late 1960's. The City of Atlanta withdrew their support for the proposed roadway and the route was eventually demapped in 1972.

<u>Slides 14 and 15</u>

In 1978 the Department completed all the remaining gaps in the Interstate system throughout all Georgia, and with the completion of a new transportation plan for the city of Atlanta, shifted the emphasis to reconstructing the freeway system in Atlanta. The old system had become grossly inadequate due to the population growth. The new plan called for adding additional lanes to the existing system and the construction of a 100 mile rail transit system.

Slides 16 and 17

Older sections of the freeway designed for 52,000 vehicles per day were predicted to carry over 200,000 vehicles per day in the year 2000.

The reconstruction was labeled "Freeing the Freeways". As the Department developed the program there were three major areas of concern:

1. cost
2. Environmenal
3. Construction under traffic.

Slide 18

The first major task to be solved was how to finance the project. This was solved by evaluating the eligibility of the various freeway segments for interstate participation. In 1963 Congress realized that a 1975 horizon for interstate design left only a 12-year traffic growth projection and the law was corrected to provide for a full 20-year traffic projection period. Atlanta's system was caught in this squeeze, therefore, became eligible for interstate funds to bring them back up to full 20-year traffic projections.

Slide 19

Some segments were justified due to having been originally constructed prior to the interstate financing program with other than interstate funds and many of the radial freeways were to contain high occupancy vehicles, also eligible for interstate financing.

Slide 20

The second major concern was environmental and public relations. Public meetings were held to review environmental concerns. The primary difficulty proved to be anticipated noise.

Slide 21

Noise was addressed with the construction of noise barriers between the expanded freeway and the major residential areas.

Slide 22

The final major task in the initial development was the design of the freeway in such a manner as to maintain traffic during the construction. Our Commissioner charged the designers with keeping the same number of lanes which existed before construction open all during the construction process.

Slide 23

This required considerable effort in the designing as the main criteria was traffic handling as well as cost effectiveness. As the projects were let to construction, contractors and construction engineers worked together with the designers and many modifications of stage construction plans were developed where money and time could be saved without compromising safety or existing traffic capacity. Many innovative ideas resulted by using this procedure.

Slide 24 (status slide)

The Department now has all the work either completed or under contract except for one segment of I-20. All of this has been accomplished since 1978. The total cost to date is 1.4 billion dollars.

Lets look now at some of the main segments of roadway and I will show you some slides of the construction underway and completed.

Slides 25, 26, 27

I-285. We began in 1978 with the reconstruction of I-285. This was the easiest portion since 64 foot wide medians allowed the addition of two lanes in each direction in the median while maintaining traffic on the outside.

Slide 28

There were some sections where we only had a 40' median and in order to develop a full eight-lane section, it was required to construct one lane in the median, move traffic over into this lane while the outside lane was reconstructed. Of course, this 'affected all the overhead bridges and required complete reconstruction of the overhead bridges in the narrow median sections.

Slides 29, 30 and 31

The section of I-75/1-85 from Williams Street to the Brookwood Station was originally constructed in the early 1950's and was a six-lane section with bad curvature and no deceleration or acceleration lanes. It has 'been widened to a twelve lane section and the alignment was changed both horizontally and vertically and several ramps were eliminated to reduce weaving problems. All bridges had to be rebuilt while maintaining traffic on the existing roadway and on the cross streets. This was done through extensive use of temporary shoring. Additional right of way was kept to a minimum by the application of retaining walls almost the entire length of the project.

Slides 32, 33 and 34

I-85 from the Brookwood Station/I-75 interchange to Lenox Road. This section converted the existing expressway to an arterial street connector. A new freeway was built immediately adjacent to the old freeway, thus getting the two facilities for the price of one. This greatly aided maintenance of traffic during construction. A 4,800 foot viaduct was constructed at one point along the project to maintain the existing expressway interchange with the local street system and also span a railroad and a creek.

Slides 35 and 36

I-85 from Lenox Road north to I-285. This section of freeway was improved from four lanes to eight lanes. The original project had a two-way uncontinuous frontage road system on each side which over-complicated the interchange ramp intersections with the cross roads. The frontage road system was redesigned to be one-way to improve the flow of traffic in a highly commercial and industrial area, several U-turn arrangements were provided to avoid the difficulties of indirection and additional traffic in the interchange areas.

Slides 37, 38, 39, 40, 41, 42, 43, 44

The I-85/1-285 North interchange in DeKalb County. The original interchange was a cloverleaf between two major freeways, I-85 and I-285, further complicated by the fact that on each leg there exists a local access interchange. The redesign of the interchange involved the reconstruction of the freeway to freeway interchange as well as the four local access interchanges while accommodating nearly 290,000 vehicles per day during construction. The bidding allowed alternative designs. DOT provided a design for steel boxes and segmental concrete boxes. The contractor proposed design, which was awarded, provided for the conventional cast in place concrete boxes. This necessitated a good bit of false work and innovative protection for that false work during construction.

Slides 45, 46, 47

I-75/I-85 in downtown Atlanta. The Downtown Central Business District segment has been under construction for about a year and a half. The portion immediately east of the Central Business District required relocation of 90 families from the Capitol Homes and Grady Homes Public Housing Projects. The extensive use of walls reduced further right of way acquisition for this portion of the freeway which was expanded from eight lanes to fourteen lanes.

Slides 48 and 49

The large I-20/I-75/1-85 interchange immediately south of the Central Business District and adjacent to the Atlanta Stadium is presently under construction to add capacity, eliminate left-hand exits, provide acceleration/ deceleration lanes and improve local access for the stadium area.

Slide 50

We could not have accomplished this work without the use of innovative design procedures. One such innovation is the extensive use of precast retaining walls. Here is shown a reinforced earth type wall consisting of precast panels with frictional straps in a granular backfield. These walls can be erected with minimal equipment in all kinds of weather in less than a third of the time of conventional reinforced concrete walls.

Slide 51

The aesthetic facings give very good and a variety of appearences.

Slide 52

Other special techniques involved the use of 'slurry retaining walls. These involve the excavation of a trench in the ground as the form work for the wall. The trench is filled with a slurry to keep the sides from caving in, a cage of reinforcing is forced into the slurry and concrete pumped in from the bottom. The wall is either strutted against a parallel wall or tied back for structural integrity. This method enabled us to limit excavation, eliminate shoring and maintain ground water levels adjacent to multi-story buildings.

Slide 53

Of course, all the planning, design, and construction was coordinated with our MARTA system or rapid rail transit system which is under construction simultaneously. Here we have a MARTA rail station constructed over the freeway to be widened. The technique used here. An existing street was raised, the rail line and station placed at the existing street elevation, and the structure widened to provide for a twelve-lane future freeway where there now exists a six-lane facility.

Slide 54

This concludes my presentation. I will certainly be glad to answer any questions.

SEATTLE - SHIP CANAL BRIDGE

SHIP CANAL BRIDGE RESURFACING CASE STUDY

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
R.E. Bockstruck, District 1 Administrator

MANAGEMENT APPROACH/POLICY ISSUES

Like many places, there are lots of reconstruction projects on Seattle area freeways. Aside from the completion of Interstate 90, a good portion of our work in the Seattle area is resurfacing work on bridges that are 20 years old and feeling their age.

To keep track of the traffic impacts of each of these projects, and to be sure we're not closing two main highways at one time, the Seattle office of the WSDOT created the Urban Construction Coordination Office.

This office has a two-pronged approach:

1) The Urban Construction Coordinator has a background in traffic and handles the day-to-day project coordination. He also reviews traffic control plans for future projects.

2) The Urban Construction Public Information Officer is responsible for letting the public know about the projects, their impacts, and what they can do to reduce their frustration and confusion.

These positions report to the Urban Construction Impacts Task Force. The Task Force handles policy issues and gives direction to the Coordinator and the Information Officer.

Their primary goal is to complete a quality job while minimizing the impacts on the public.

This new office proved its worth during the summers of 1984 and 1985, when WSDOT resurfaced two bridges with latex modified concrete on Interstate 5 just north of the Seattle CBD.

PROJECT DESCRIPTION

Interstate 5 is the Seattle area's major north-south roadway. The section of I-5 we resurfaced carries 210,000 vehicles per day in both directions.

The northbound lanes that were resurfaced are approximately one mile in length. The southbound resurfacing project was about twice that length.

Interstate 5 includes a separate, reversible roadway called the Express Lanes. It runs north from the CBD for a distance of 8 miles. The Express Lanes were not resurfaced during these projects.

The need for the resurfacing is evident when you consider the condition of the roadway: the exposed reinforcing steel, extensive delamination, and chloride intrusion threatened the integrity of the bridge decks,

We used the Express Lanes as the primary alternate route during the resurfacing. We did this by working on the northbound lanes one year and the southbound lanes the next.

The northbound lanes on the two structures were resurfaced the summer of 1984. The main impact was on the afternoon commute home from work -- leaving the downtown area and driving through the construction area headed to the northend or across Lake Washington via SR 520.

The southbound lanes on these structures were resurfaced during the summer of 1985. The impacts were primarily to the morning work commute for residents in the northend or on the eastside working in Seattle.

TSM MEASURES

During the northbound project, we estimated that about 7700 vehicles would be required to divert daily from I-5. We anticipated the impacts for the southbound project to be much worse: over 22,000 vehicles were estimated to have to divert from I-5.

During these projects, the WSDOT was committed to close coordination with enforcement, transit, and local agencies to mitigate the impacts of the construction projects.

Our objective was to reduce the number of vehicles in the construction area. We did this by encouraging commuters to:

* change their route,
* change their mode of travel to buses or carpools, and
* change the time of their trip to outside the peak hours,

We encouraged the use of alternate routes in three ways:

1 - by retiming signals on parallel routes,

2 - by restricting access to the freeway upstream of and through the construction area, and

3 - by extending the hours of operation for the Express Lanes as an alternate route.

Cross-over ramps between the mainline lanes and the Express Lanes were built. These ramps increased access to the Express Lanes and allowed traffic to bypass the construction site and return to the mainline.

Transit and Carpools were encouraged by implementing HOV only ramps in critical areas. Riding the bus was encouraged by funding additional bus routes. Some buses were re-routed to avoid the worst of the anticipated congestion.

We worked with businesses and employee groups to encourage the use of flexible working hours. Up-to-the-minute reports on traffic conditions were given to the media and passed on to the public.

The Urban Construction Coordinator and Information Officer worked closely with the Project Office. They kept the traffic control plan as responsive as possible to changing conditions.

The Urban Construction Coordination Office worked in cooperation with other agencies, The Coordinator was the focal point for technical interagency coordination. The Information Officer coordinated information efforts with other agencies.

CONSTRUCTION/CONTRACTING ISSUES

We learned a valuable lesson about phasing of the construction work during the northbound resurfacing in 1984.

We wanted to avoid impacting the peak travel times as much as possible. We scheduled preparation work to be done during the off-peak, reopening lanes to traffic during heavy commute times.

Then we closed two lanes at a time to lay down the concrete and let it cure. It was a good idea in theory.

But in fact, it took the contractor a lot of time to deal with daily traffic control setting. The entire project took much longer than expected. And the public was confused by continual changes in traffic patterns.

For the southbound resurfacing in 1985, we put down barrier the first day, The contractor did all preparation and paving work on two lanes and then switched to the other two lanes. His operation went much smoother and more efficiently, There was a fairly stable driving condition' for motorists. Even though the southbound project was almost twice the length of the northbound project, it was completed in much less time,

Incentive clauses were an important part of both contracts. For the northbound project, a $10,000 bonus was to be paid for each day ahead of schedule the resurfacing work was completed. Conversely, the Contractor had to pay a $10,000 penalty for each day behind schedule he completed the work. For the southbound project, the bonus/penalty was $20,000 per day.

PUBLIC INFORMATION

An extensive information campaign was developed to give the public enough advance information so they were prepared for the project. We described the anticipated impacts and how motorists could deal with those impacts.

A second objective was to maintain a positive image of WSDOT in the community, Both motorists using I-5 and residents in the project area were targeted for special information efforts.

Brochures were prepared to explain the project in some detail. Notices were sent to residents, special events, and community groups to address their special circumstances. Presentations were given to business and community groups to respond to their specific concerns.

A 24-hour Hot Line was put into operation. The Hot Line was also a helpful internal device, It allowed all other WSDOT offices to turn over inquiries to the Hot Line, relieving both project and administrative personnel of information duties.

All information pieces were developed in cooperation with Metro Transit and Commuter Pool and the City of Seattle to present a unified public image.

Media contacts were scheduled to coincide with major project shifts. Particular emphasis was placed on daily contact with traffic reporters to get accurate information' to motorists.

Pertinent information was also provided to motorists by means of variable message signs and the highway advisory radio system.

RESULTS

The results of these efforts were exceptional,

During 1984, weekday traffic volumes on northbound I-5 decreased 38% through the project area,

During the 1985 project, weekday traffic volumes were reduced 40%.

These incredible results stem from close coordination of traffic and information efforts. Letting people know in advance gives them time to prepare. A survey done in the Seattle area indicated that 89% of the residents knew about the project and believed the work was necessary.

We were able to encourage people to try buses and . Carpools The requests for ridematching increased 56% in August of 1985 compared to August of 1983. In the summer of 1985, bus ridership figures showed an increase of 10% over a usual summer .

LESSONS LEARNED

Based on our experiences incentive clauses should only be used on critical phases of the contract.

The incentives make the Contractor more responsive to schedule. However, they make contract administration more difficult by placing increased importance on the number of working days -- claims are virtually unavoidable.

Incentive clauses should only be used on projects with major impacts and should be based on the costs of those impacts to the public.

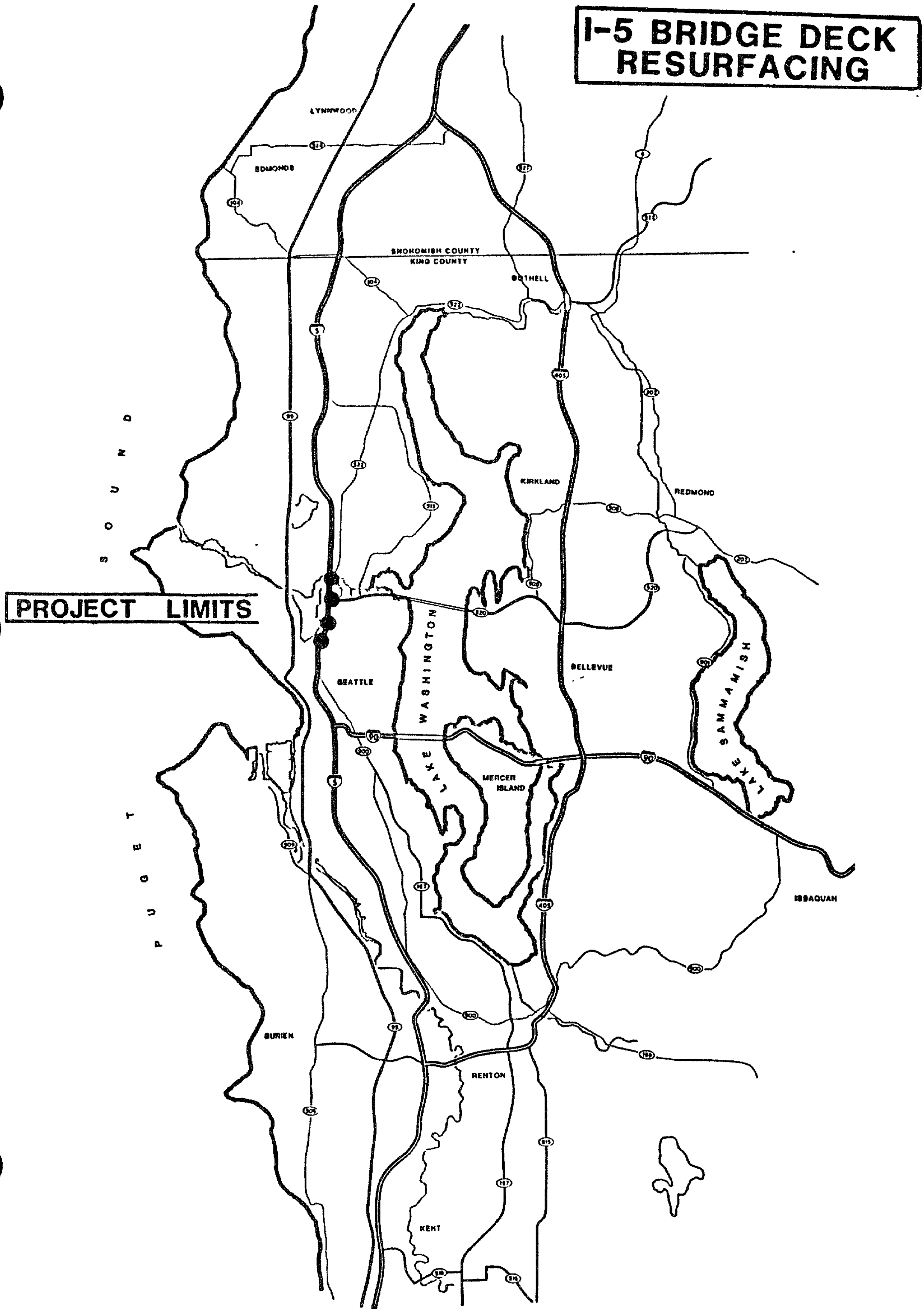
Phasing of the construction is critical. **It's** best to make the entire project as efficient as possible and get the job done on time.

The most critical lesson we learned was the importance of public information. The public was well informed about the project before it began. They understood the need for the work and the anticipated impacts. Motorists could plan alternate routes.

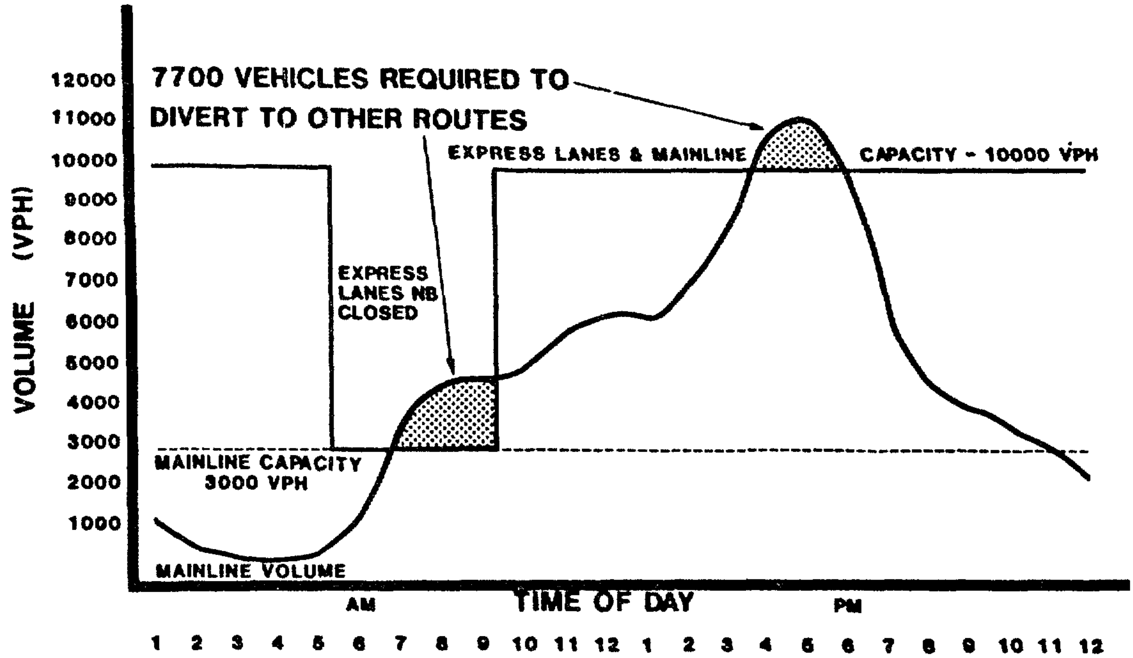
Finally, the Urban Construction Coordination Office provided a focal point for project coordination for the public, other agencies, and people within the Department.

It wasn't bad enough that this project was going on, we had many other projects going on at the same time throughout the Seattle area. Closures and impacts had to be coordinated among all these projects. Traffic control plans were modified in response to change6 in traffic patterns. The public information was kept timely and to the point.

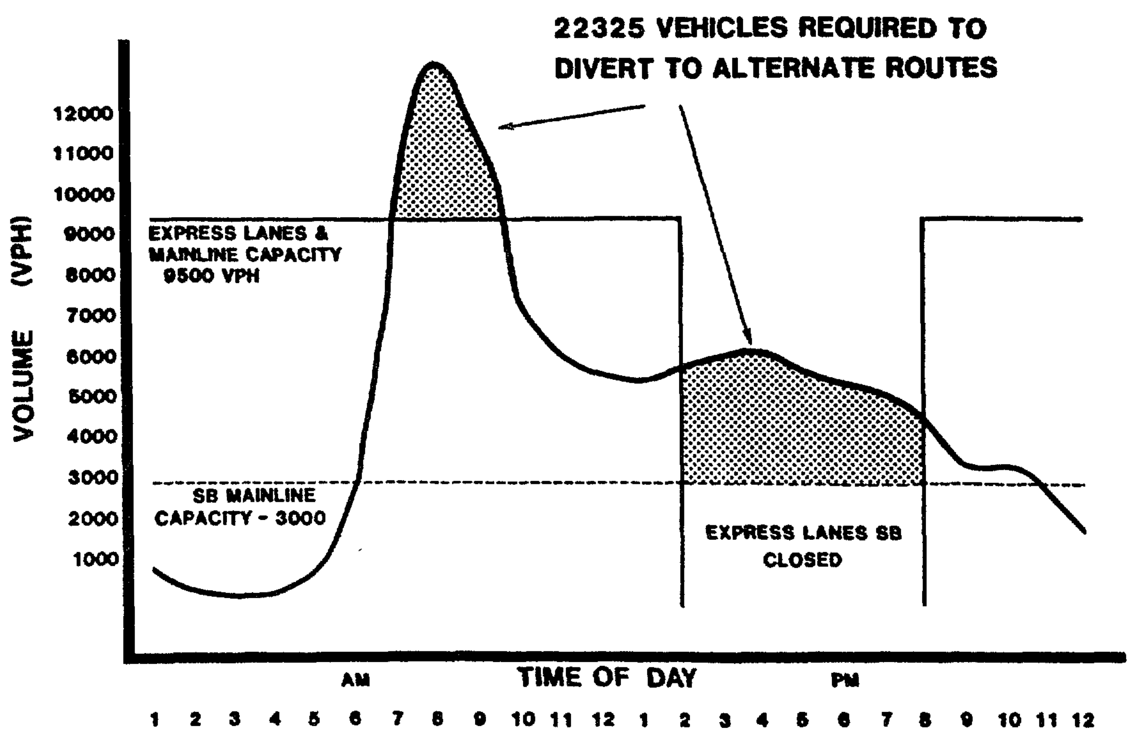
So after a summer of irritating, congestion-free commuting, it was good to get back to the normal stop-and-go conditions we were all used to.


I-5 BRIDGE DECK RESURFACING
PROJECT LIMITS
LYNNWOOD
EDMONDS
SNOHOMISH COUNTY
KING COUNTY
BOTHELL
KIRKLAND
REDMOND
SEATTLE
BELLEVUE
LAKE WASHINGTON
LAKE SAMMAMISH
MERCER ISLAND
ISSAQUAH
BURIEN
RENTON
KENT
PUGET SOUND

1984 I-5 NORTHBOUND RESURFACING



1985 I-5 SOUTHBOUND RESURFACING



BOOTH GARDNER
Governor

DUANE BERENTSON
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION
Office of District Administrator . D 1. 643 1 Corson Ave So, C-81410 . Seattle, Washington 98108

April 22, 1965

Dear Employer:

The Washington State Department of Transportation will begin resurfacing the southbound lanes of Interstate 5 from Northeast 45th Street to Denny Way during June. This work will require closure of two lanes around the clock until the project is completed.

When the northbound lanes of I-5 were resurfaced last year, WSDOT was able to keep four lanes open during peak traffic periods during the summer. This year, that is not possible because of the amount of work that must be accomplished in a relatively short time. As a result, traffic congestion is expected to be much more severe than last year, and most southbound I-5 commuters will experience delays while traveling to work during morning peak hours.

We are asking for your cooperation in the following ways:

-- Allow your employees work-schedule flexibility whenever possible. That will allow them to avoid travelling during peak commuting hours and facilitate their choice of travel by bus, carpool and Vanpool.
-- Make sure your employees receive materials provided by WSDOT and Metro about the resurfacing project and available commuter services.

Metro services include ridesharing, vanpooling, existing and additional special transit options , and information about work-schedule flexibility programs. For information on bus schedules, call Metro new-rider information at 447-4800. Metro's commuter service representatives are available at 447-7770 to help you implement work-schedule flexibility programs and organize employee transportation services.

With your cooperation, our agencies will do their best to minimize difficulties for your business and your employees while this vitally important resurfacing project is under way.

Sincerely,

R. E. BOCKSTRUCK, P.E.
District Administrator
WSDOT

RONALD J. TOBER
Director of Transit
Metro

CAM:njh

CHICAGO - LAKE SHORE DRIVE

TRAFFIC MANAGEMENT FOR CHICAGO'S LAKE SHORE DRIVE RECONSTRUCTION PROJECT

JOHN N. LaPLANTE, P.E.

CHICAGO DEPARTMENT OF PUBLIC WORKS

Project Description

Traffic management concepts and tools have been a part of traffic engineering in the Chicago area for many years. However, it is only recently that these everyday operational techniques have been recognized as an important element inshortrange transportation planning, and thus are being coordinated and incorporated-into the overall plan of transportation improvements.

The City's most important recent construction project has been the reconstruction and relocation of Lake Shore Drive between Huron and Monroe Streets. The major portion of this project began in May 1984, and will be completed in late 1986. The project consists of the complete reconstruction of Lake Shore Drive between Huron and Monroe Streets, including the elimination of the dangerous S-curve just south of the Chicago River. Also included are the elimination of four signalized intersections to be replaced with a complicated ramping system, including a two-level bridge and roadway over the Chicago River north to Grand Avenue.

Planned Development and Policy Issues

In the early planning for this project it was decided that the high volume of traffic crossing the Chicago River at this point (up to 90,000 vehicles per day) precluded the possibility of significantly reducing the number of traffic lanes crossing the Chicago River. However, since this project was part of a larger project to provide new roadways serving the entire Illinois Central Air Rights Development and proposed Ogden Slip Development south and north of the Chicago River, including a new bridge across the river at Columbus Drive, it was possible to devise a detour routing plan that would make use of the newly constructed Columbus Drive Bridge for all of the southbound Lake Shore Drive traffic, while routing the northbound traffic on existing Lake Shore drive. While this allowed Lake Shore Drive to be constructed half at a time it did require delaying the Lake Shore Drive reconstruction until the Columbus Drive Bridge had been completed.

TSM Measures

During the construction period, all southbound Lake Shore Drive traffic is being detoured west on Ontario Street, south on Fairbanks Court and Columbus Drive (both made one-way southbound) across the Chicago River, and back east on Monroe Street to Lake Shore Drive. Northbound traffic remains on Lake Shore Drive, using whichever half of the roadway is available at that time.

Prior to the start of construction, meetings were held with transit agencies to work out any necessary bus route changes, to develop a program for encouraging the public to switch to mass transit, and to make any scheduled changes that might facilitate such a mode switch. Meetings were also held with the Chicago Park District officials to insure adequate access at all times to the Monroe Street underground parking garage.

An intense towing program was instituted on Ontario Street. This was preceded by a warning ticket program one week before the detour went into effect, to warn of the impending towing program.

Plan Implementation and Management

Immediately prior to the beginning of the detour, a meeting was held

the traffic patrol servicemen, the police, and the radio room personnel, to make sure that everyone understood the extent of the detour plan and the need for good communication throughout this project.

Since that time, regular discussion and review of this project occurs both at the Mayor's Traffic Management Task Force weekly meetings and the bi-monthly meetings of the C.A.T.S. Traffic Operations Committee.

Key station traffic monitoring stations on Columbus Drive, Lake Shore Drive, and Michigan Avenue are being kept in operating condition so that traffic volume changes can be monitored. In addition, "before" period traffic speed trial runs on both southbound and northbound Lake Shore Drive were conducted, so that adequate data would be available for comparison purposes during the construction phase.

Construction and Contracting Issues

Prior to the start of construction, meetings were set up with all three contractors and appropriate resident engineers, project engineers, police, and traffic personnel to insure a proper understanding of the contract provisions regarding installation and maintenance of the detour signs, markings, and barricades, and to set up direct communication links so that any problems or breakdowns could be immediately addressed and resolved.

A Lake Shore Drive Monitoring Task Force composed of all the project engineers and resident engineers, along with appropriate contractor representatives meets approximately once a month to monitor progress of the construction and to work out any problems that arise.

Public Information

Prior to the start of construction, meetings with affected aldermen were held to discuss the proposed plan and possible sources of complaints.

Meetings were then held with affected residential and commercial building managers, to work out access problems caused by Lake Shore Drive congestion and/or the Columbus-Fairbanks one-way'operation.

The motoring public was alerted to the upcoming traffic detour through a comprehensive media campaign. Motorists were actively discouraged from using Lake Shore Drive, particularly during the peak periods. This campaign included information packets to the media, live broadcasts and interviews with knowledgeable City representatives, special briefings for those radio and TV personnel responsible for broadcasting the daily rush period traffic reports, and full use of the facilities provided by the City's transportation media consultant (Central Transportation Bureau, Inc This includes weekly bulletin updates, daily hot-line information, and up-to-the-minute radio announcements as traffic conditions develop.

A system for maintaining media contact was established, so that changes in the detour could be disseminated to the public, and problems or questions by the media could be quickly and correctly answered as they came up. The Department of Public Works can answer questions regarding the project progress and any construction problems, while the Central Transportation Bureau is available to answer questions regarding immediate traffic conditions.

Effectiveness and Lessons Learned

The results of this effort have been evident, both in the public acceptance of the detour and the relatively few traffic problems observed since the de'tour began. There was an initial 40% decrease in peak hour through traffic volumes, but the volumes have been slowly increasing so that currently there is only a 10% to 15% difference between before and after peak hour volumes. On a 24-hour basis, there has been no change in traffic volumes, which are in the 80,000 to 90,000 ADT range. Traffic has increased on paralleling arterial streets (Michigan, Clark, and LaSalle), particularly during the morning rush period.

Travel times through the detour area have not changed during the morning peak period. However, there has been a four-minute increase in travel time during the evening peak. Traffic volume and travel speed data is continuing to be collected, and further monitoring reports will be forthcoming.

The most important lessons learned from this experience have been the importance of adequately planning the various TSM and public information measures to be taken prior to the construction of the project and then the absolute need for some sort of on-going interdisciplinary traffic management group that can meet on a regular basis to resolve the inevitable problems that come up during any construction project of this magnitude.

LOS ANGELES OLYMPIC EXPERIENCE

State of California
Business, Transportation and Housing Agency
Department of Transportation
District 7
Los Angeles

Heinz Heckeroth
District Director

David H. Roper
Deputy District Director
Office of Operations

CALTRANS TRANSPORTATION MANAGEMENT PLANNING AND OPERATIONS FOR THE 1984 SUMMER GAMES IN LOS ANGELES

AN OLYMPICS SUMMARY REPORT

SEPTEMBER 1984

PREPARED BY: JAMES DON JUGE

SUBMITTED BY: CHARLES J. O'CONNELL

June **1985** Printing

Years of planning and coordination culminated in 16 days of perhaps the most successful Olympiad ever staged. From every perspective there is agreement, the 1984 Summer Games were a success. This was clearly evident from a transportation and traffic view.

The concept of the Los Angeles transportation system operating essentially congestion free was not so clearly evident when transportation agencies first assembled two years ago to begin planning for Olympic traffic. On the freeway system alone, motorists experience daily congestion on nearly 225 of the 700 miles in the morning peak and 275 miles in the afternoon/evening peak. The Olympics would impact this system with an estimated 6 million spectators at 24 venues spread throughout the basin with events scheduled throughout the day and nearly 25,000 athletes, world media and Olympic family transported to the venues on set timetables.

From the beginning, it was clear that there was neither time nor money to develop major new transportation facilities. This left public transportation agencies with the task of planning and managing Olympic traffic essentially through transportation system management techniques. Similarly, it became clear that there could be no Olympic traffic czar. The success of any plan would depend upon the willingness of each transportation and law enforcement agency to perform their traditional functions in cooperation with each other. Under the overall umbrella of the Integrated Planning Group, over 50 federal, state, county and local agencies coordinated their Olympic planning efforts. Caltrans' Olympic Task Force, functioning through the Traffic Control Subcommittee of the Olympic Security Coordinating Committee, coordinated and stimulated the development of Olympic transportation plans with the California Highway Patrol (CHP), the Los Angeles City Department of Transportation (LADOT), the Los Angeles City Police Department (LAPD), the Los Angeles Olympic Organizing Committee (LAOOC), the Southern California Rapid Transit District (SCRTD) and numerous other government and private transportation planners and operators.

Initial planning began with the development of an inventory of transportation conditions and needs at each venue. Following this, Olympic event requirements and desired operational characteristics for each venue were identified and the resulting individual plans related to the transportation system as a whole.

These venue transportation concepts led to the cooperative development of three primary transportation management tools:

- o venue traffic management plans (19 plans)
- o freeway traffic condition maps (12 maps)
- o bus system plan (24 routes)

Typically, the venue traffic management plans provided such details as preferred spectator routes, bus priority streets and ramps, one-way streets, designated parking, parking restrictions, signing, traffic officer placement, signal timing and other traffic management requirements, The major traffic impacts were around the Los Angeles Coliseum area and the Westwood/LAX area,, Daily operational strategies were developed for the implementation of each plan,

The traffic condition maps depicted the congestion which could be expected to occur on the freeway system if no adjustments to traffic demand and travel patterns were made,, These congestion forecasts were based on historical data for typical August traffic upon which the best estimate of the effect of Olympic traffic was superimposed. Event capacity, expected attendance, spectator arrival time, vehicle occupancy, modal split and route assignments [O&D) were the elements used in developing the Olympic traffic demands, Three different Olympic event days were selected as typical and estimated limits of congestion at 8 a.m,, 11 a.m., 3 p.m., and 6 p.m. were developed for each. These typical days were weekends, non-Coliseum event weekdays and Coliseum event weekdays (maximum Olympic traffic days). Congestion was defined as slow and go traffic, 10 to 30 mph. Six of the l2 traffic condition maps are shown in Figures l-l through l-6.

The estimate of available parking and the transportation system capacity at each venue led to the development of modal split targets and set the desired bus use as a function of the shortfalls. The resultant Olympic bus systems plan consisted of 24 routes for spectators utilizing a fleet of 500 extra buses as a supplement to regular public bus service. This plan provided three types of service - shuttle, park and ride, and express - from major activity centers in the region ta and from Olympic venues. Each day's bus system and schedule was tailored to that day's Olympic event schedule and spectator needs, A portion of the desired bus use was assigned to charter services provided by the private sector.

As the planning continued, it became apparent that cooperation from the entire region would be necessary for success, Caltrans took the lead in establishing an adhoc committee to accomplish this goal of public awareness, Numerous public and private agencies from Los Angeles, Orange and Ventura Counties, meeting regularly, developed and implemented an Olympic traffic communications plan. Specific information was developed for the business and industrial communities, daily commuters, Olympic spectators and the general public describing traffic management plans and expected traffic conditions and suggesting techniques such as flex time, four-day work week, vacations and change in delivery schedules as a means to help businesses operate and at the same time alter traffic patterns during the period of the games. "Operation Breezeway", a joint Caltrans/CHP outreach program, provided tailored information to the trucking industry.

Telephone hot lines were set up to keep the general public informed. A permanent public display of venue traffic management and Olympic bus plans was placed in the lobby of the Caltrans District 7 office. A Caltrans mobile information van provided a travelling display at shopping and other community centers to get the word out to the general public. The result was an awareness on the part of the business community and the public that normal travel patterns would have to be modified during the Olympics to prevent a worsening of normal congestion patterns,

As the Olympic period approached, all agencies became aware of an increased interest on the part of the media for information about an anticipated Olympic traffic problem. Caltrans developed numerous media contacts, provided special interviews and opened the Traffic Operations Center (TOC) to full press access. A media center was established in the District office building for use immediately preceeding and during the Olympics. Caltrans, LADOT, CHP and SCRTD held regular 9 a.m. and 1 p.m. press briefings at which time information on the prior day's traffic conditions, today's traffic experience, and forecasts of tomorrow's traffic conditions were discussed. The interest level at these media briefings and for special interviews remained high throughout the 16 days of the Games.

As the Games drew near, the transition from planning to operation began to unfold. At a level of interagency coordination never before experienced, each agency put their Olympic personnel, equipment and facilities into full swing.

The Caltrans District 7 office became the Olympic Traffic Center for the region. A unique interagency operation - The Traffic Coordination Center (TCC) - was housed here, close to the District's Traffic Operations Center (TOC). The TCC was staffed on a 24-hour schedule by the operating public and private transportation agencies who utilized %he inflow of traffic information to adjust their operations and manage the system,, Traffic situations with an Olympic impact were managed through the TCC.

Major incident response teams were at full alert. Maintenance and hazardous material identification teams were on standby, poised to support the rapid clearance of a spilled load or overturned truck or to assist in traffic management operations in a "SWAT" like manner.

Nearly the entire freeway system had been cleared of maintenance, construction and encroachment permit activities which could affect traffic even by gawking. All available lanes were placed in service, including peak hour shoulder lanes. The system was a% maximum capacity.

Ramp metering,, on those freeways leading to and through the Westwood/LAX and the Los Angeles Coliseum/downtown areas, was expanded to an all day operation and to include the weekends, The metering plan, tailored to each freeway segment, operated from as early as 5 a.m. to as late as 9 p.m.

Special temporary park and ride facilities were established throughout the region, Working through the individual school districts, school parking lots were converted into carpool and bus parking facilities for use by commuters and spectators within the neighborhoods.

Olympic venue guide signs pointed the way for spectators to each sport. Guide panels, identifying the sport, were installed atop the freeway overhead signs and on the off-ramps and local streets in a pattern delineating the spectator routes identified in the venue traffic management plans, The signs provided an essential element for the effective operation of the traffic management plans,

In addition to the fixed message venue guide signs, 50 ground-mounted changeable message signs (CMS) informed motorists of trouble locations and impending congestion on the system and suggested system balancing diversions and alternate routes to the venues. At several locations, the CMS were integrated into the venue traffic management plans and were routinely utilized daily to establish and adjust the operation. The signs were operated through the Traffic Operations Center (TOC) with input'from field units.

Each day a specific traffic management plan for that day was put into motion by the many operating agencies. On pre-set timetables, traffic management teams consisting of traffic engineers in sedans, changeable message sign trucks and trailers, and maintenance field units implemented Caltrans' portion of the plans on the freeways and State highways at the venue sites, Traffic patterns were altered, bus only ramps established, ramps closed and opened and motorists informed of the current traffic situation. Field operations were closely coordinated with the CHP and local traffic and law enforcement units. Field command posts a% the venues were manned by Caltrans operations personnel with radio contact to field units and the TOC. In all, about 15 sedans, 20 CMS trucks and trailers and numerous maintenance units were deployed.

On six separate occasions urban freeways were used as venue sites to stage cycling and marathon practices and events, Segments of three different freeways, including a 17-mile stretch of one major freeway, were closed to all public traffic in both directions. The major closures were on weekends. Traffic Management strategies consisting primarily of diversion plans and signed detours were implemented during each closure. Congestion on the system as a result of the closures was insignificant.

The Traffic Operations Center (TOC) operated around the clock and was the nerve center for Caltrans' traffic management activities. All incoming and outgoing information was funneled through the TOC for centralization and continuity. The TOC was the eyes and ears of what was happening. Over 200 miles of electronic surveillance supplied real time detailed traffic information for use in making sound traffic management decisions and in monitoring those decisions. This information also provided a base for an analysis on how the system was operating. Fifteen (15) closed circuit television cameras (CCTV) provided instantaneous verification of incidents and the traffic situation at several key locations in the central Los Angeles area. The TOC was the radio link for all Caltrans field units and also the link, via telephone, for selected information flow to and from the Traffic Coordination Center (TCC).

Monitoring of the system was enhanced by the deployment of ground and air traffic observers. At 24 key locations along freeway routes, volunteers from all branches in the district monitored traffic from commercial and office buildings and provided incident and congestion information to the TOC via hand-held radios. The Department of Defense (DOD) provided six (6) helicopters for exclusive use in traffic management, Volunteer air observers responded to incidents and trouble spots and radioed detailed information to the TOC. The ground and air teams were indispensable verification tools in assessing system operation during the games.

An assessment of congestion on the system as perceived through the various monitoring techniques was compared daily to the pre-Olympic forecasts. Utilizing the freeway traffic condition maps and the available traffic information from the TOC, a pictorial comparison was developed for each of the four timeframes for each of the 16 days of the games. Six of the 64 maps have been selected as typical and are presented in Figures l-1 through 1-6. Appropriate maps were displayed each day at the 9 am. and 1 p.m. press briefings held in our media center.

As the Olympics approached, the entire freeway system began operating essentially congestion free with total daily volumes (ADT) down about 2-3%. More importantly, the a.m. peak flattened, beginning some 30 to 45 minutes earlier. Peak hour volumes were down about 7% with a noticeable decrease in the number of trucks.

The free-flow conditions continued through the first week of the games. There was some evidence, however, that the shifts in peak hour flows were beginning to slip back to pre-Olympic patterns. Light localized congestion began to appear at some venues. By Wednesday, the combined background and Olympics traffic was about equal to the pre-Olympic normal. On Friday, August 3rd, the Coliseum events began and ADT rose to slightly above normal levels The system continued to operate with very little congestion. Bus patronage to the Coliseum area was reasonably good and the City streets operated quite well,

The second week began with about a +5% ADT and moderate congestion here and there. Bus patronage to the Coliseum continued to be good and surface street operations improved as minor operational adjustments took effect. On Wednesday, August 8, the system operated well through the morning and into the afternoon with ADT at about +8%, That evening, with over 97,000 spectators attending the soccer game at the Pasadena Rose Bowl, the first patterns of extensive congestion occurred. The early 6:00 p,m. starting time and the low spectator bus patronage (only 6%) were the most likely causes,

Through the remainder of the week,. the system continued to operate well although ADT continued to climb and more congestion (moderate) began to show -- particularly in the evening peak. On Friday, ADT was at +ll%. That evening" the Rose Bowl area operated with very little congestion. The Coliseum operation continued to work well. The Westwood area, however, experienced some heavy congestion as spectator traffic and "onlookers" traffic mixed. There were no real problems during the final weekend with the exception of a helicopter crash early Sunday afternoon on the Harbor Freeway near the Coliseum. Quick clearance of the helicopter averted a major impact with the Closing Ceremonies crowd.

For each day of the Olympics, daily traffic volumes and delays were compared to the normal summer conditions (August 1983 traffic data) for a portion of the freeway system known as the "42-mile loop," See Figure 2, upper portion, The 42-mile loop is a triangular network, located in central and west Los Angeles, consisting of the Santa Monica Freeway (I-103, the Harbor Freeway (I-1101, and the San Diego Freeway (I-405). The loop is heavily equipped with electronic sensors embedded in the roadway pavement providing vehicular volume and speed data to a central computer in the TOC. Figure 3 presents bar graphs depicting a percentage comparison of the volumes and delays,

If we are to benefit from our Olympic experience, we must concentrate our efforts on those factors which contributed the most to its success. Selective application of the lessons learned can improve our day-to-day travel patterns.

First and foremost, the entire transportation system was in a maximum state of readiness. Traffic management strategies, techniques and systems were in full operation,, Venue traffic plans (special event in nature) were implemented daily with timeliness and precision. Motorist information systems kept commuters and spectators informed of the best routes. Accurate and timely traffic condition information was shared by numerous agencies, each performing their traditional functions. Many agencies used the information to enhance their daily operation. Joint decisions were made and plans adjusted accordingly. Public awareness was at its zenith. The system would have performed well even under more adverse conditions than were experienced.

A shift in the commute travel patterns broadened and flattened the peak periods. Hourly volumes were down about 7%, The result -- congestion was down by as much as 60%. A very light shift and reduction in peak hour volumes produced dramatic reductions in congestion. This concept. well known to transportation managers, was very clearly demonstrated.

Truck traffic was down particularly during peak hours, Overall reduction was about 6% with as much as 16% during peak periods. With an estimated 1 to 5 ratio, trucks to automobiles, heavy dividends can be realized by shifting trucks to the non-peak periods.

Very few major incidents occurred at critical times or locations. Undoubtedly, free-flow conditions and fewer trucks were key factors. With major incidents contributing heavily to the total congestion experienced each day, again, a small adjustment can have a dramatic impact,

Commuter carpooling/ridesharing remained essentially unchanged. Tke only noticeable increase in vehicle occupancy was in spectator vehicles inbound to the Coliseum venues,

Spectators made extensive use of the SCRTD Olympic bus system, particularly at the Coliseum and Westwood areas. Total ridership was 1,145,350 with a peak day of 135,000 (8/11/84). This was an essential element of the traffic management plan. During the one major congestion experience of the Olympics, the evening of August 8th at the Rose Bowl, bus patronage was a disappointing 6%. See Figure 2 for daily spectator attendance at the games and daily bus boardings,

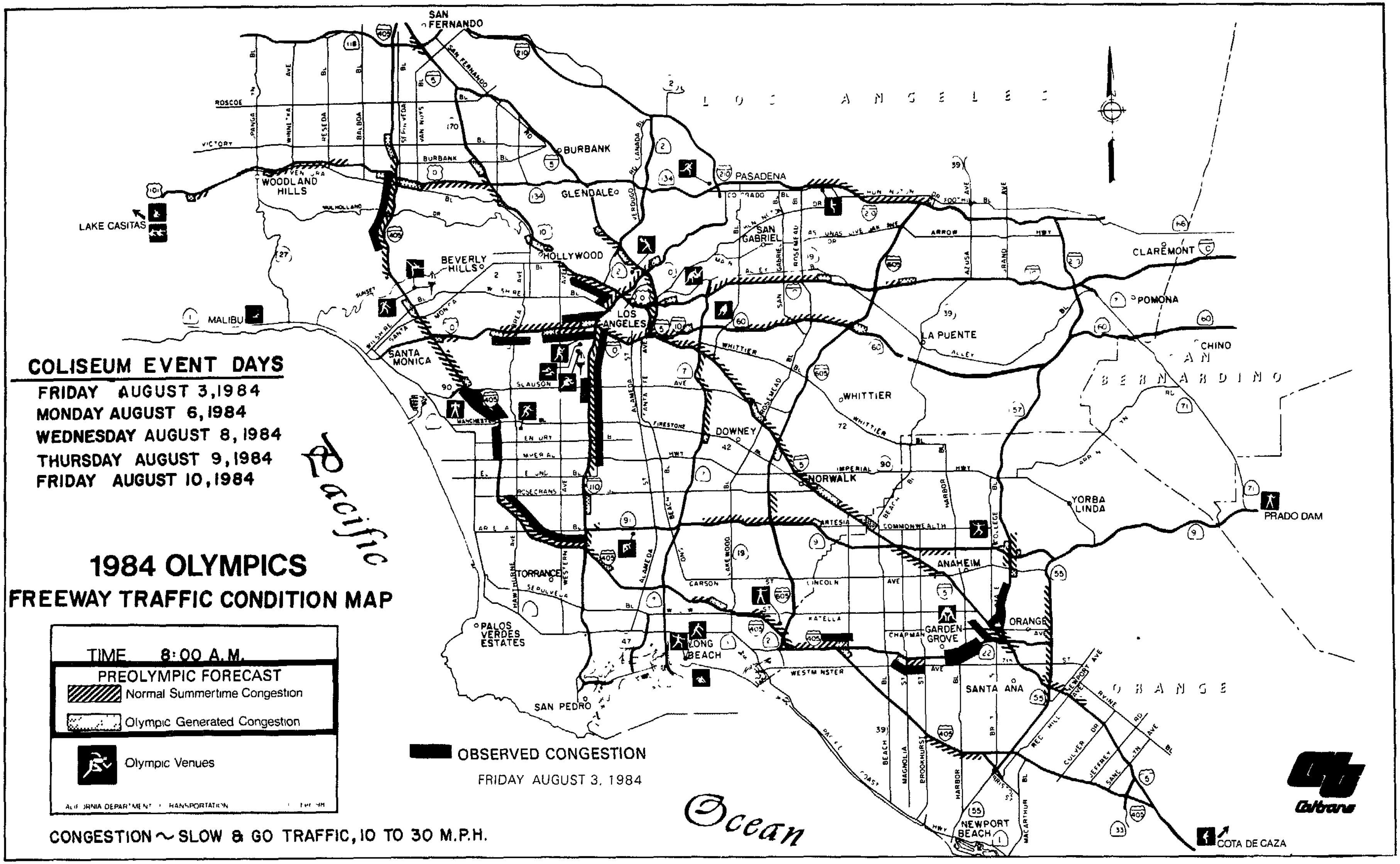

COLISEUM EVENT DAYS
FRIDAY AUGUST 3,1984
MONDAY AUGUST 6,1984
WEDNESDAY AUGUST 8,1984
THURSDAY AUGUST 9,1984
FRIDAY AUGUST 10,1984
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 8:00 A.M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
FRIDAY AUGUST 3, 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M.P.H.
Pacific
Ocean
LOS ANGELES
SAN BERNARDINO
ORANGE
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
SAN GABRIEL
CLAREMONT
POMONA
CHINO
LA PUENTE
WHITTIER
DOWNEY
NORWALK
YORBA LINDA
PRADO DAM
ANAHEIM
ORANGE
GARDEN GROVE
SANTA ANA
NEWPORT BEACH
COTA DE CAZA
LONG BEACH
SAN PEDRO
PALOS VERDES ESTATES
TORRANCE
SANTA MONICA
BEVERLY HILLS
HOLLYWOOD
WOODLAND HILLS
LAKE CASITAS
MALIBU

FIGURE 1—1

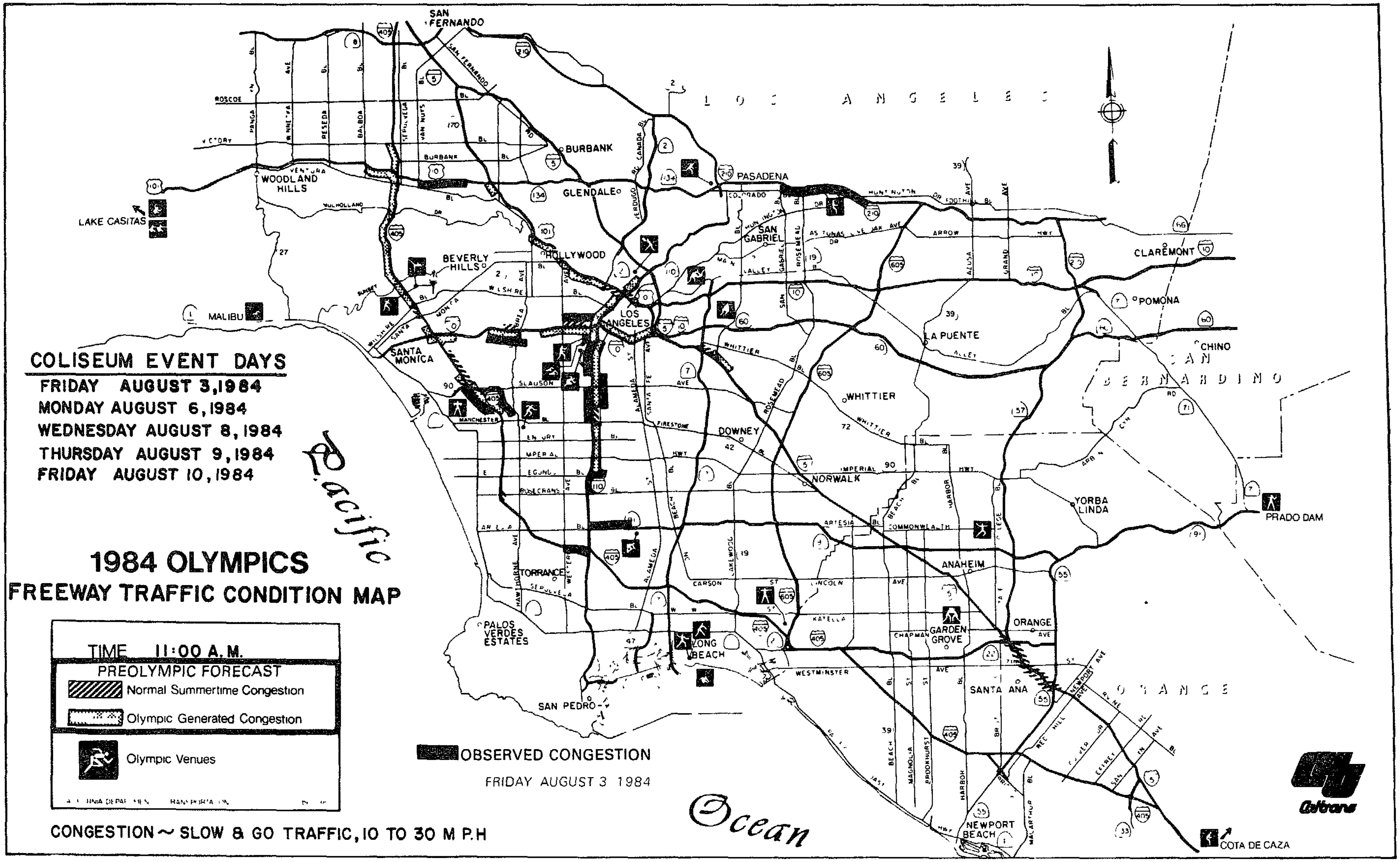

COLISEUM EVENT DAYS
FRIDAY AUGUST 3, 1984
MONDAY AUGUST 6, 1984
WEDNESDAY AUGUST 8, 1984
THURSDAY AUGUST 9, 1984
FRIDAY AUGUST 10, 1984
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 11:00 A.M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
FRIDAY AUGUST 3 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M.P.H
Pacific
Ocean
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
WOODLAND HILLS
LAKE CASITAS
MALIBU
BEVERLY HILLS
HOLLYWOOD
LOS ANGELES
SANTA MONICA
SAN GABRIEL
LA PUENTE
WHITTIER
DOWNEY
NORWALK
TORRANCE
PALOS VERDES ESTATES
SAN PEDRO
LONG BEACH
ANAHEIM
GARDEN GROVE
ORANGE
SANTA ANA
NEWPORT BEACH
YORBA LINDA
CLAREMONT
POMONA
CHINO
PRADO DAM
COTA DE CAZA
Caltrans

FIGURE 1—2

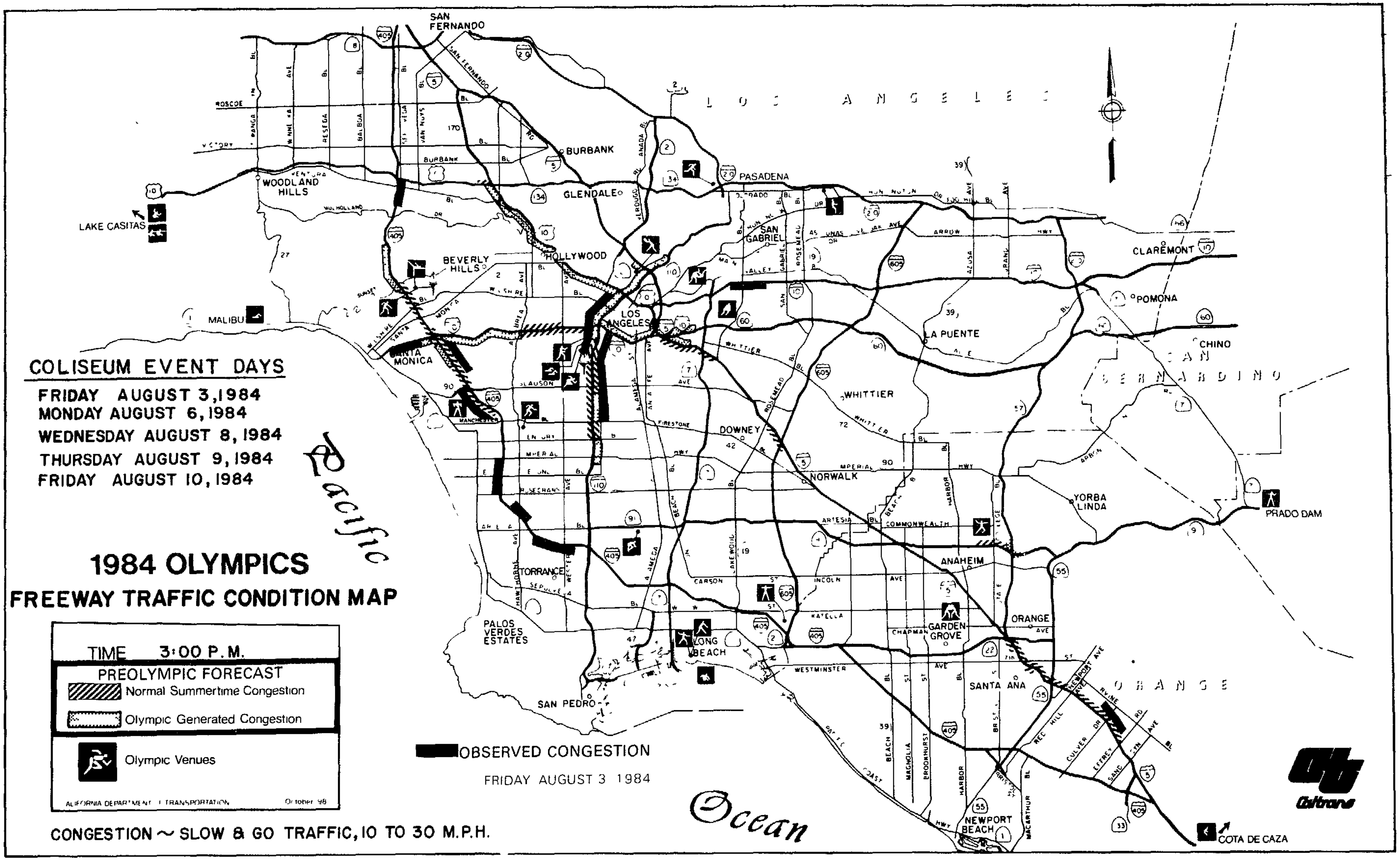
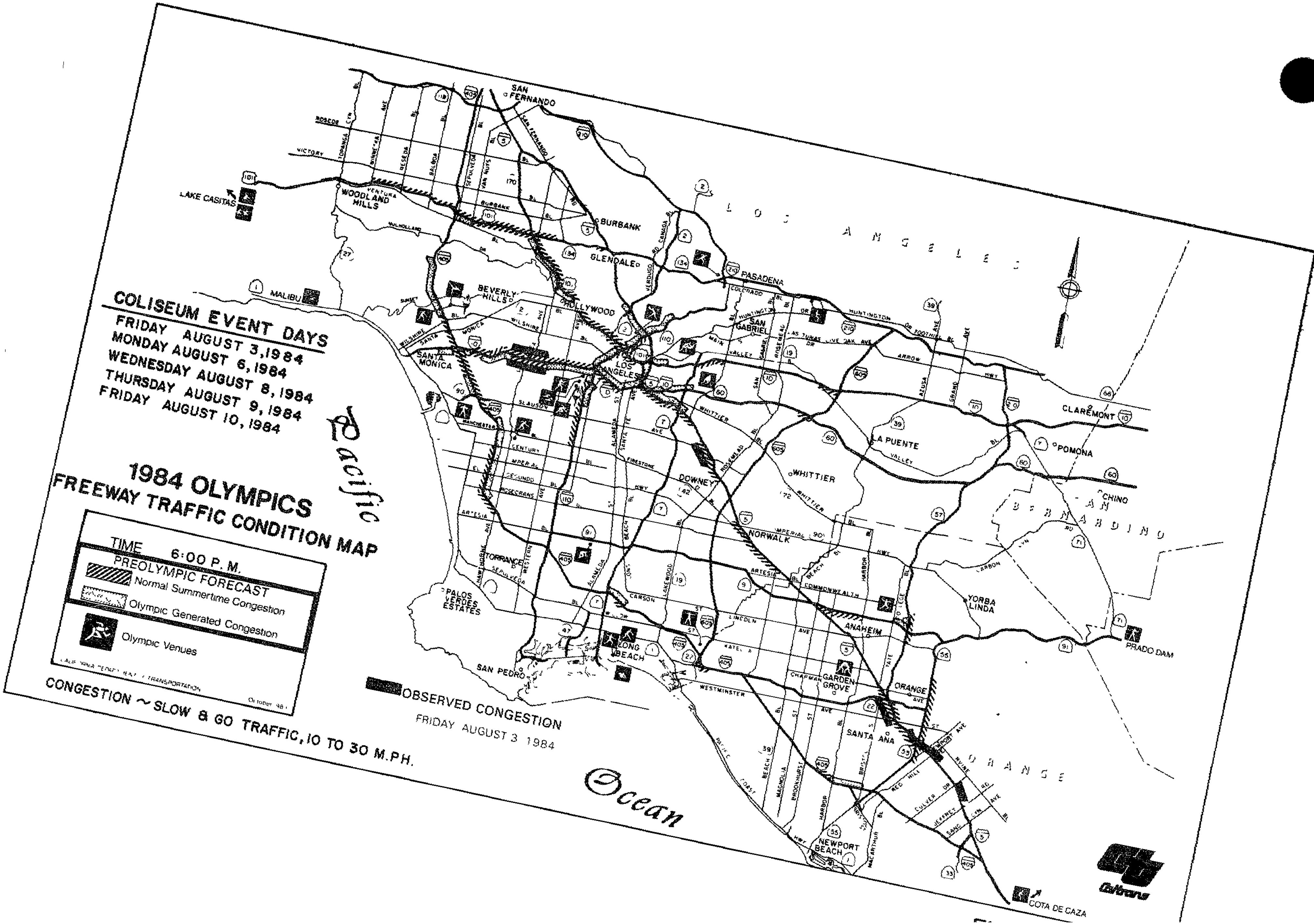

COLISEUM EVENT DAYS
FRIDAY AUGUST 3,1984
MONDAY AUGUST 6,1984
WEDNESDAY AUGUST 8,1984
THURSDAY AUGUST 9,1984
FRIDAY AUGUST 10,1984
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 3:00 P.M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
FRIDAY AUGUST 3 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M.P.H.
Pacific
Ocean
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
HOLLYWOOD
BEVERLY HILLS
SANTA MONICA
LOS ANGELES
WOODLAND HILLS
LAKE CASITAS
MALIBU
SAN GABRIEL
LA PUENTE
WHITTIER
DOWNEY
NORWALK
TORRANCE
PALOS VERDES ESTATES
SAN PEDRO
LONG BEACH
ANAHEIM
GARDEN GROVE
ORANGE
SANTA ANA
NEWPORT BEACH
YORBA LINDA
PRADO DAM
CLAREMONT
POMONA
CHINO
COTA DE CAZA
Caltrans

FIGURE 1—3


COLISEUM EVENT DAYS
FRIDAY AUGUST 3, 1984
MONDAY AUGUST 6, 1984
WEDNESDAY AUGUST 8, 1984
THURSDAY AUGUST 9, 1984
FRIDAY AUGUST 10, 1984
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 6:00 P. M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
FRIDAY AUGUST 3 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M.P.H.
Pacific
Ocean
LOS ANGELES
ORANGE
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
HOLLYWOOD
BEVERLY HILLS
SANTA MONICA
LOS ANGELES
WOODLAND HILLS
LAKE CASITAS
MALIBU
SAN GABRIEL
CLAREMONT
POMONA
CHINO
LA PUENTE
WHITTIER
DOWNEY
NORWALK
TORRANCE
PALOS VERDES ESTATES
SAN PEDRO
LONG BEACH
ANAHEIM
GARDEN GROVE
ORANGE
SANTA ANA
YORBA LINDA
PRADO DAM
NEWPORT BEACH
COTA DE CAZA
Caltrans

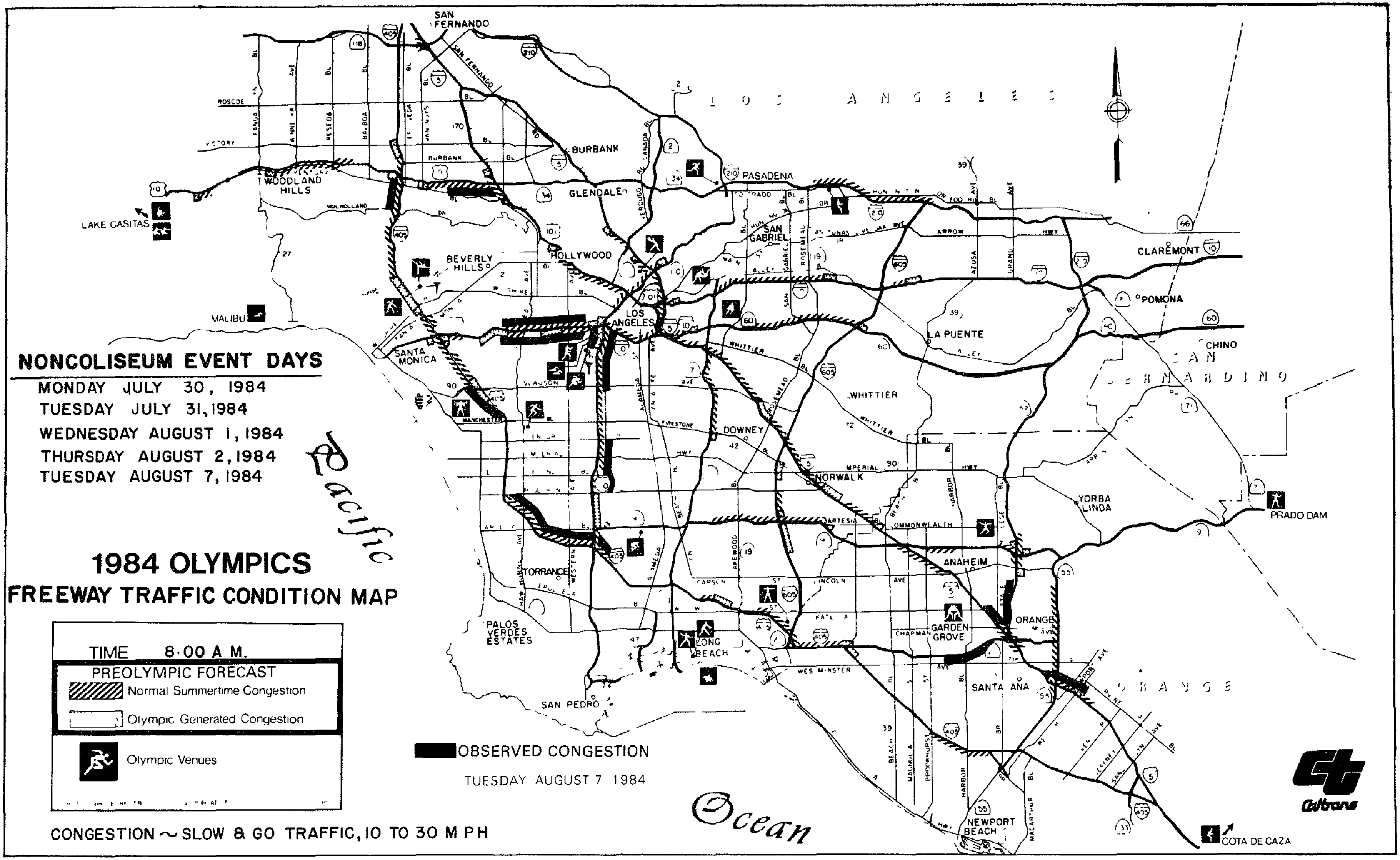

NONCOLISEUM EVENT DAYS
MONDAY JULY 30, 1984
TUESDAY JULY 31, 1984
WEDNESDAY AUGUST 1, 1984
THURSDAY AUGUST 2, 1984
TUESDAY AUGUST 7, 1984
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 8·00 A M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
TUESDAY AUGUST 7 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M P H
Pacific
Ocean
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
WOODLAND HILLS
LAKE CASITAS
MALIBU
BEVERLY HILLS
HOLLYWOOD
LOS ANGELES
SANTA MONICA
SAN GABRIEL
LA PUENTE
CLAREMONT
POMONA
CHINO
WHITTIER
DOWNEY
NORWALK
TORRANCE
PALOS VERDES ESTATES
SAN PEDRO
LONG BEACH
ANAHEIM
GARDEN GROVE
ORANGE
SANTA ANA
YORBA LINDA
PRADO DAM
NEWPORT BEACH
COTA DE CAZA
Caltrans

FIGURE 1–5

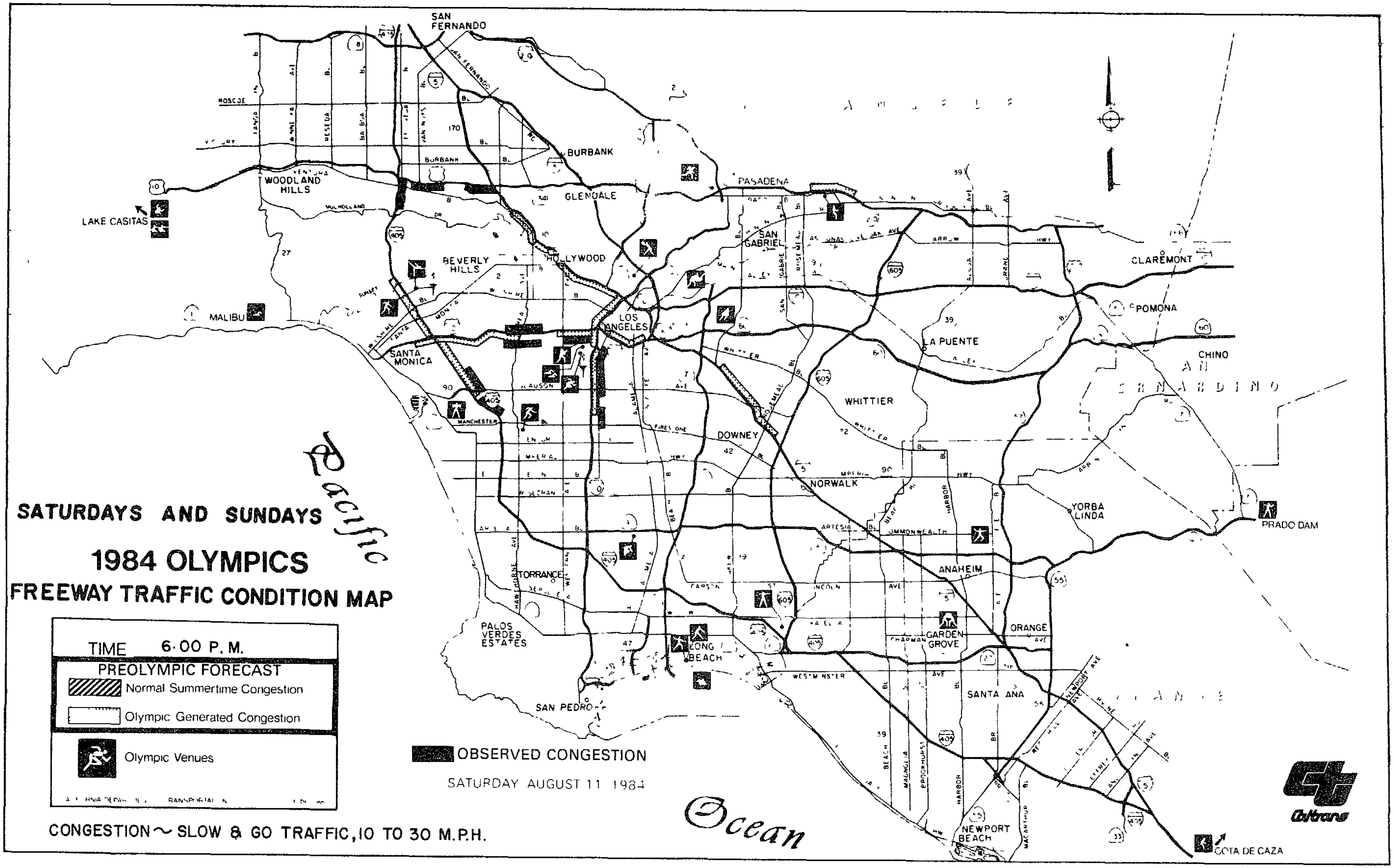
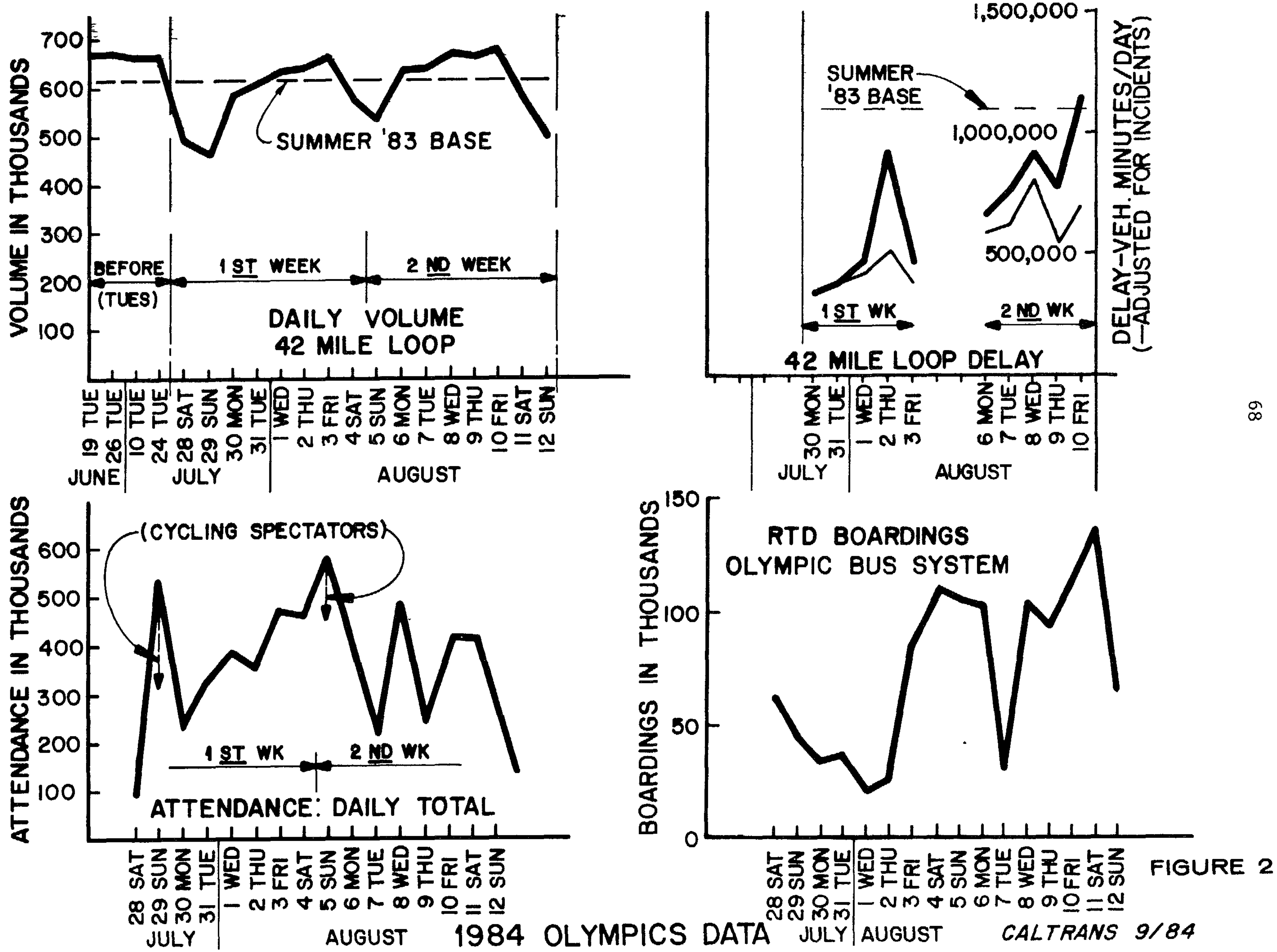

SATURDAYS AND SUNDAYS
1984 OLYMPICS
FREEWAY TRAFFIC CONDITION MAP
TIME 6·00 P. M.
PREOLYMPIC FORECAST
Normal Summertime Congestion
Olympic Generated Congestion
Olympic Venues
OBSERVED CONGESTION
SATURDAY AUGUST 11 1984
CONGESTION ~ SLOW & GO TRAFFIC, 10 TO 30 M.P.H.
Pacific
Ocean
SAN FERNANDO
BURBANK
GLENDALE
PASADENA
WOODLAND HILLS
LAKE CASITAS
MALIBU
BEVERLY HILLS
HOLLYWOOD
LOS ANGELES
SANTA MONICA
SAN GABRIEL
CLAREMONT
POMONA
CHINO
LA PUENTE
WHITTIER
DOWNEY
NORWALK
YORBA LINDA
PRADO DAM
ANAHEIM
ORANGE
GARDEN GROVE
SANTA ANA
TORRANCE
PALOS VERDES ESTATES
LONG BEACH
SAN PEDRO
NEWPORT BEACH
COTA DE CAZA
Caltrans

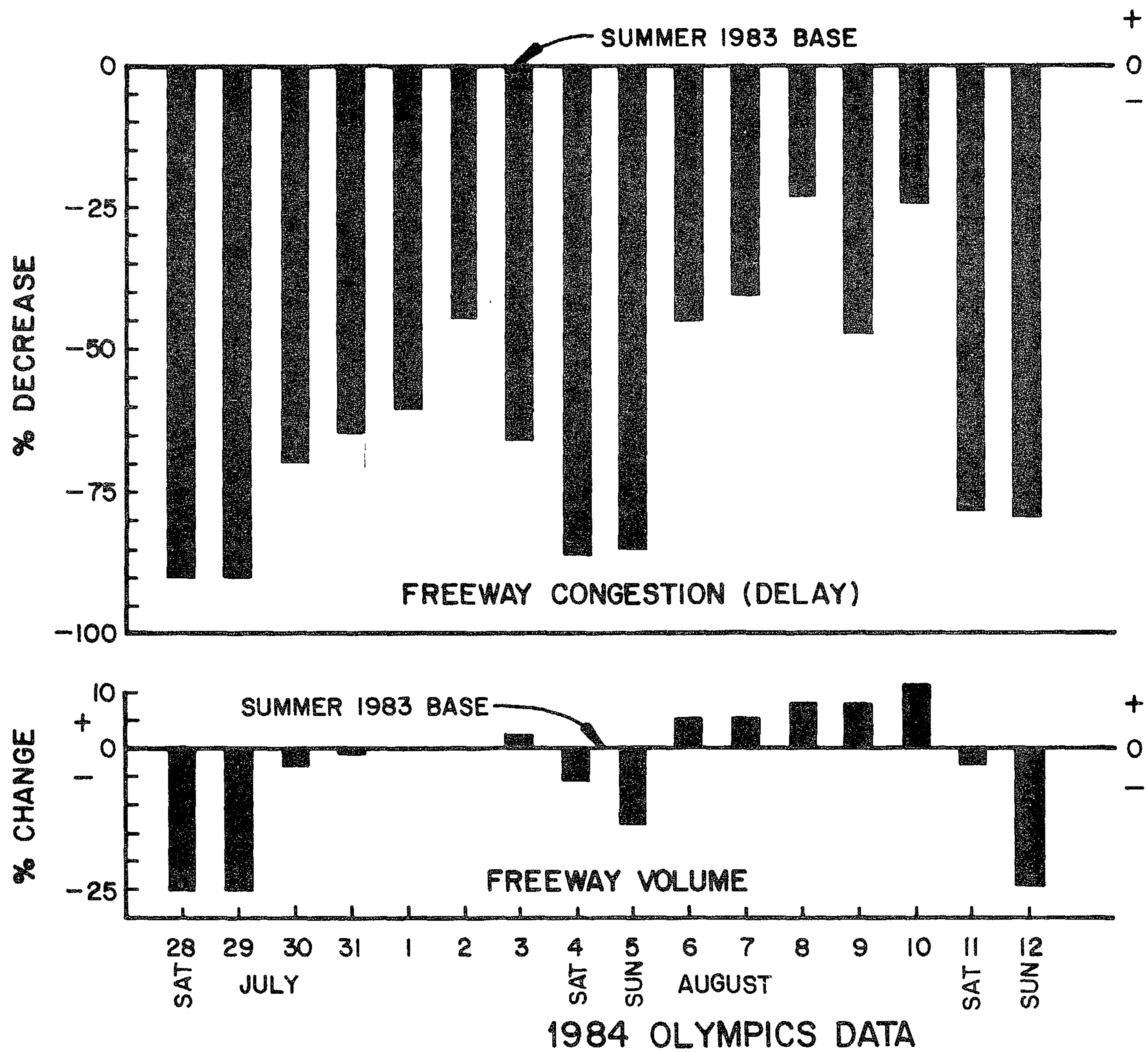
FIGURE 1—6



1984 OLYMPICS DATA

CALTRANS 9/84

FIGURE 2



DELAY & VOLUME
42 MILE LOOP
(ADJUSTED FOR INCIDENTS)

FIGURE 3

CALTRANS 9/84

PITTSBURGH - I-376

The following case studies describe some recent operational experiences of the application of TSM measures to mitigate the adverse irrpacts of major reconstruction in Pittsburgh, Pennsylvania, and Boston, Massachusetts.

PITTSBURGH, PENNSYLVANIA - I-376, PARKWAY EAST

In March 1981, the Pennsylvania Department of Transportation (PennDOT) undertook a 2-year, $62 million reconstruction and safety update of a 6.5 mile section of the heavily traveled I-376 (the Parkway East) in Pittsburgh, Pennsylvania. The project included concrete pavement overlay, rehabilitation of 21 bridges, lighting and ventilation for a tunnel along the route, new roadway light ing, in-proved signing, placement of a concrete median, and other safety features.

The 6.5 mi le section of the Parkway that was being reconstructed normal ly carried over 130 ,000 vehic les per day. For the 2-year reconstruction period, on-ranps at four interchanges along the 6.5 mile section were closed. in the first construction season, March 1981 through October 1981, the westbound through lanes were closed and one lane in each direction was provided in the two eastbound lanes. In the second construction season, March 1982 through October 1982, the eastbound lanes were closed and the westbound lanes carried all the traffic. Cm-pounding the traffic capacity problems were the lack of alternate high-speed, high-capacity routes in the corridor leading to the downtown.

In an attempt to mitigate severe traffic congestion in the corridor for Parkway East users, the PennDOT established a planning task force made up of Federal, State, and local transportation planners and engineers to develop strategies to manage “people movement” through the corridor during the reconstruction period. Although many strategies were discussed, the task force established a plan that contained six programs:

A new commuter rail train called the “Parkway Limited” that operated twice during the morning and evening rush hours betwaen several eastern suburbs and downtown Pittsburgh along existing Conrail trackage.

A new Vanpool program in the corridor where vans are teased and Vanpools are organized by a third-party coordinator.

High occupancy vehicle (HOV) ramps at both end's of the reconstruction zone, intended to encourage ridesharing and express bus use.

Over 20 new park-and-ride lots at shopping centers or churches for use by travelers on express bus and those forming Carpools or Vanpools.

Ten new express bus routes in the corridor that would be coordinated with new and existing park-and-ride lots.

Traffic operations improvements along major alternate routes in the corridor (e.g., pavement widening, signal hardware improvements, signal coordination, left-turn restrictions, reversible lanes for capacity no-parking restrictions, and signing and marking In addition, traffic control by off-duty police officers was provided at 21 critical locations in the corridor.

Of particular importance in this reconstruction effort was the publicity and community liaison and marketing effort carried out by PennDOT. These efforts were intended to inform the commuter and other corridor travelers about the potential for traffic disruptions. This information program involved over 100 community meetings prior to and during the reconstruction, publication of a project map, specific information on the six alternative strategies, and frequent participation in radio and TV talk shows by PennDOT personnel. Special marketing programs and surveys were conducted at employment sites, in order to promote and encourage use of the six strategies.

In order to monitor, evaluate, and adjust traffic management activity in the corridor, PennDOT undertook an extensive before, during, and after data collection/analysis effort. Screenlines was identified from which to gather information on vehicle volumes and classification, auto occupancies, and route diversions. Perhaps the most important data collection came from a user group of travelers in the corridor. A panel of 2,300 Parkway users was identified through response to a mail-back card which was distributed along the Parkway East. The panel was subsequently contacted by mail before, during, and after the project with questionnaires to identify their responses to the reconstruction and the various alternative TSM strategies.

As a result of the reconstruction, travel on the 6.5-mile section of the Parkway East dropped by two-thirds, to about 40,000 vehicles per day. The average travel time increased 10 minutes on the Parkway East and about 6 minutes during peak periods on the six designated alternate routes. As expected, the primary traveler responses to the reconstruction included changes in route choice and earlier departure times for work. There was a measurable increase in vanpooling in the corridor. With the traffic operations improvements, the roadway system in the corridor was able to accommodate a major change in traffic patterns with some increased congestion but without massive traffic jams.

The effectiveness of each of the strategies is summarized as follows:

- The “Parkway Limited” service carried an average of 250 passengers per day with an average cost per passenger trip of over $20. The average fare paid was $1.90 per trip. Because the rail service offered no real tine advantage over the auto, van, or transit and because of the expense of service to PennDOT and the users, ridership declined over the first construction season. Service was finally terminated after 182 days.

- Over 300 people used the new vanpool service. The cost per person trip was about 23 cents, the lowest of any strategy. The participants contributed to the costs of operating the Vanpools through a monthly fee, while the costs to PennDOT were only for organization and startup. The costs to PennDOT decreased during the second construction season even though more vans were added. A large portion of the vanpoolers were previous transit users. Many of the Vanpools continued operation after the construction was over, representing a permanent direct reduction in traffic volume and a market for ridesharing activity.

- The park-and-ride lot activity depended on the activity of the other strategies, particularly transit, vanpooling, and carpooling activity. Two-thirds of the users rode transit, and the remainder formed Carpools and Vanpools. The lots handled about 660 person trips per day, representing 235 vehicles parked, at a cost to PennDOT of $3.72 per day. The cost per person trip was about $.57. These costs included leasing and maintenance.

- The HOV ramps did accomplish an improvement in average travel time and an increase in auto occupancy along the Parkway East. This occurred even though the average auto occupancy in the corridor remained about the same. Slightly n-ore than 900 vehicles per day used the ramps at a cost to PennDOT of $6.36 per day.

- About 1,400 people per day used the 10 new express bus services, representing a direct diversion of 500 vehicle trips from the corridor and about 320 vehicle trips from the Parkway East. About 30 percent of the users came from park-and-ride lots, and many came from carpools or other transit services. The first year cost of the service was about $1.7 million, representing a cost per person trip of $4.76. Average fares revenue per person was slightly better than $1.00.

- The traffic operations had a significant effect on capacity by enabling several arterials to accommodate substantially larger volumes at the same or lower overall travel time. The reduced travel times occurred despite the fact that the arterials were generally congested prior to the reconstruction project.

Many of the strategies implemented were mutually dependent on each other. The data on effectiveness showed that the traffic operations improvements, the HOV ramps, and vanpooling were the most cost-effective strategies implemented during the reconstruction project. The new express bus and commuter rail service were generally expensive relative to their incremental effect on corridor congestion. Several of the strategies will have permanent benefits. The traffic operations improvements and the vanpool program will persist, representing permanent improvements in travel time and the level of ridesharing.

The experience of the Parkway East reconstruction project can provide useful insights that can be helpful to other communities contemplating similar efforts. The traffic operations improvements are the most effective mans of accommodating diverted vehicle trips. The third-party vanpool program in the corridor was the nest cost-effective strategy implemented for moving people and for initiating rare permanent vanpooling opportunities in the corridor after the reconstruction. The HOV ramps were effective in increasing vehicle occupancies along the Parkway East. For the most part, the actions complemented and supported each other. This was especially true for the park-and-ride lots, the transit and vanpooling programs, and the HOV ramps.

The Parkway East project represented the first real attempt at corridor management during reconstruction. The planning task force involved many State, local, and Federal actors who were responsible for identifying problem areas, recommending solutions, and implementing specific actions. Citizen groups and business groups were also actively involved in the planning process. Perhaps the most significant aspect to this project was that it demonstrated how TSM strategies can be implemented to manage travel demand in a corridor when major reconstruction is underway.

BOSTON – SOUTHEAST EXPRESSWAY

Corridor Transportation Management for Highway Reconstruction :

SOUTHEAST EXPRESSWAY, MASSACHUSETTS 1984- 1985

Authors

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Sonia Weinstock

Mary Ellen Sullivan

Date

May, 1986

This document was prepared by CENTRAL TRANSPORTATION PLANNING STAFF, an interagency transportation planning staff created and directed by the Metropolitan Planning Organization, consisting of the member agencies.

Executive Office of Transportation and Construction
Massachusetts Bay Transportation Authority
Massachusetts Department of Public Works
MBTA **Advisory Board**
Massachusetts Port Authority
Metropolitan Area Planning Council

EXECUTIVE SUMMARY

1.1 INTRODUCTION

Although anticipated as an extremely disruptive project, the reconstruction of Boston's Southeast Expressway when finished was considered by politicians and engineers alike as a model of how to reconstruct a major expressway while maintaining travel in the transportation corridor. The success of this reconstruction effort can be attributed-to several factors discussed in this report. These factors included the development of a comprehensive corridor traffic management plan for both construction site and off-site locations, the extensive use of public information and media exposure, the use of flexible mitigation strategies which allowed the responsible agency to adjust the traffic management plan as additional experience was obtained, and the use of a task force to coordinate the numerous agency actions in plan implementation.

The purpose of this report is to describe the corridor traffic management plan used by the Massachusetts Department of Public Works (MDPW) during the reconstruction of the Southeast Expressway. The response of the traveling public to the reconstruction project and to the corridor traffic management plan is also discussed.

1.2 CONTRACTUAL REQUIREMENTS - ROADWAY WORK

A major effort was made to retain as much traffic capacity as possible on the facility itself without causing a major delay in the completion date. The roadway plan involved dividing the road into four, two-lane sections. Lane pairs were separated by Jersey-barriers which extended the length of the project. Two lanes were under construction at all times. Four travel lanes were thus maintained in the peak direction, two in the off-peak direction and the MDPW specified the lowest volume hour as the time for reversing the central lane pair. The central reversible lanes were designated as "express lanes"; truck use was prohibited from these and automobile access was restricted to through traffic by the presence of the continuous (Jersey-type) lane barriers.

This configuration worked remarkably well, in fact, perhaps better than the original roadway pattern which it was replacing. Although considered infeasible for year-round operation, the channelized express lanes produced higher vehicle speeds and fewer accidents than did the pre-existing facility. Although there were other conditions which were different in the construction phases (e.g., increased police presence and 24-hour tow trucks), it was principally the enhanced vehicle capacity through the construction site which minimized the project's impact on corridor travel.

1.3 PLANNING THE TRAFFIC MANAGEMENT PLAN

A multi-agency task force was created to address the construction-related problems which would result from the disruption caused by the massive project. Critical to this effort was the realization that no single means of transportation would be sufficient to handle the entire shift in travellers, should the capacity of the system be severely curtailed, Furthermore, it was felt that current Expressway users should be provided with many options, rather than being channeled into one or two improved alternate modes. One of the conclusions of the planning task force was that there existed a need for funds to promote transit alternatives and to improve services and options on each mode.

1.3.1 The Transit Package

To follow a strategy of providing as many options as possible to Southeast Expressway users,. a multimodal transit alternatives package was developed by the task force. The package consisted of the following:

- o Increased commuter rail service,
- o Increased commuter boat service.
- o Increased private commuter bus service.
- o Additional T, BAT and private feeder bus service to Red Line.
- o Increased T, BAT and private feeder bus service to commuter rail lines.
- o A joint pass program between private bus companies and boat operators.
- o Additional police for security on Red Line.

The following summarizes the improvements made to each mode:

Commuter Rail

- o 2,100 additional rush hour seats.
- o Stoughton Branch doubled peak period frequency.
- o Express trains between Boston and Sharon on Attleboro branch.
- o Additional peak hour service on Franklin Branch.
- o Additional off-peak trains on Framingham Line.

Commuter Boat

- o Doubled peak period trip frequency between Bingham and Boston.
- o Private boat operations initiated between Squantum and Boston,

Bus Service

- o Additional public/private bus service in 27 communities.
- 0 1,200 new one-way trips mostly on existing routes.
- o New types of coordination between private bus operators, private boat operators and the MBTA (for example, private operators were given the right to sell T (monthly) passes at a 20% discount to their customers).

Park and Ride

- o 1,000 new or leased park and ride spaces were added for vanpool, carpool and bus staging.
- o 500 park and ride spaces were created at commuter rail stations by restriping and expanding current lots at Canton Junction, Readville and Route 128.
- o Additional police were stationed at commuter rail and park and ride lots to handle increased traffic and to provide better security.

1.3.2 Promotion of the Project and Travel Alternatives

Although difficult to quantify, it is generally accepted that the success of the project was due, in large part, to the extensive public information/community relations campaign carried out by the MDPW and each of the transit service providers. The emphasis of the public information effort was to reach all affected communities and to provide them with clear information on the anticipated construction delays and the range of alternatives. The team also served as a community relations task force which received community concerns and negotiated solutions to them. In addition to a variety of promotional responsibilities such as news releases, monthly bulletins, and brochures, two other strategies employed were:

- o A commuter information clearing house was operated through CARAVAN, Inc., a private non-profit organization.
- o A variable work hours program was promoted in downtown Boston.

1.3.3 Non-Traffic Measures

Of importance to the overall success of the project were a number of non-traffic measures which were used to improve the flow of traffic, to provide rapid response to emergencies and to enforce temporary regulations of the construction period.

Police Enforcement

Additional police details were added to provide enforcement and emergency response support. Alternate routes were also served by added police during peak hours and/or at intersections identified as near capacity.

Emergency Response

To minimize accident response time and reduce the effect which accidents could have on traffic flow, the contractor was required to provide four tow trucks on weekdays and two on Saturday and Sunday, During the week, tow trucks were located at either end of the facility and two at the mid-point. One of the mid-point tows was dedicated to ramp service, Emergency access was provided to the express lanes by a series of gates placed at one-mile intervals.

Screening in the Construction Area

Paddle screens were installed on the side(s) of work areas to prevent motorist distraction. The intention was to eliminate the potential of driver curiosity to disrupt traffic flow and thereby reduce the effectiveness of the traffic management plan. The presence of screens at all work sites have eliminated the motorist's expectation of viewing work activities, allowing for complete concentration on driving and, thereby, effectively eliminating the curiosity factor, This worked well in increasing travel speeds and decreasing the probability of accidents.

Local Aid to Communities

In addition to the other mitigating measures, a $500,000 pool was created to be used for aid to local communities especially affected by the reconstruction efforts. The communit ies were eligible for funding based on their documentation of need.

1.4 PERFORMANCE OF THE TRAFFIC MANAGEMENT PLAN DURING RECONSTRUCTION

1.4.1 Project Site Measures

Between 5,000 and 9,000 vehicles per day were diverted from the Expressway during the first year. Second year volumes were roughly equivalent to pre-reconstruction levels. Peak period volumes, however, increased beyond pre-reconstruction levels in the morning peak direction in each of the two project years. Mid-day and evening peak volumes declined during the first year, but increased to approximately pre-reconstruction levels during the second year. These findings suggest that the first year reductions in mid-day and PM peak volumes came about as mid-day Expressway users chose to avoid the facility. Several observations support this conclusion:

- Work trip travel on the Expressway continued at or above pre-reconstruction levels throughout the reconstruction period.

- Peak period traffic volume changes on alternate routes were consistent between morning and evening periods indicating that increased use was work trip generated.

- Public transit improvements were generally geared to better peak period service and therefore, had little effect on mid-day general purpose users.

- The public information program discouraged discretionary use of the facility.

- Mid-day users were confronted with the additional uncertainty of the effects of reversing the express lanes.

- Discretionary trips such as shopping, social, and to a lesser extent medical and personal business, can be satisfied by alternate destinations.

It seems plausible that the reductions in mid-day and evening peak period-peak direction travel apparent on the facility stemmed from an absence of discretionary mid-day trips. This discretionary travel, moreover, appears to have been eliminated from the corridor and diverted from downtown Boston to suburban destinations.

Peak period travel times on the Expressway declined during the first year of reconstruction. This improved level of service was due to traffic management methods and not traffic volume reductions. Peak period travel demands increased somewhat as traffic operations through the construction site improved in response to the express lane configuration. Second year travel time increases were found to occur in conjunction with increases in peak period volumes that again approached service volume capacity.

1.4.2 Alternate Routes

Traffic volumes on the alternate routes increased by more than the 9,000 vehicle per day reductions reported on the Expressway. Second year traffic volumes were not monitored, however, recorded changes in travel time provide an indication of traffic levels. During the first year of reconstruction, the TSM-type improvements implemented on the alternate routes provided lower travel times to the higher vehicle levels reported. During the second year no further capacity improvements were made and morning and evening peak period travel times increased suggesting additional growth in vehicle levels.

1.4.3 Rapid Transit Ridership

Expressway travel conditions seemed to have a direct influence on the changes in rapid transit ridership. During the first year when Expressway peak conditions were improved, rapid transit ridership remained fairly constant. Second year deterioration of Expressway levels of service contributed to an average daily ridership increase of 6.8 percent, or a total of 1,700 passengers

1.4.4 Park and Ride Lot Use

Use of MDPW Park and Wide lots increased on average by 126 vehicles or 7 percent during the first phase and 175 vehicles or 9 percent during the second phase. This increase was in response to increased capacity and a greatsr number of bus, Carpool, and vanpool opportunities available at the sites. These factors caused a shift to designated sites by users of ad hoc facilities as well as attracting first time users. A survey of commuter parking lot users taken during the first year of reconstruction found 6.9 percent of the users (50 vehicles) previously used the Expressway, another 4.3 percent (31 vehicles) previously used other Pots and 6.5 percent or 47 vehicles previously commuted by other means.

1.4.5 Commuter Boat

The growth in commuter boat ridership (+90 passengers the first year; +300 passengers the second year) was attributed to the following three reasons: significant expansion of services: seasonal variation; and a sizeable latent demand for a high-quality boat service. The negative impact of the reconstruction project did not seem to serve as a major influence? on this ridership increase.

1.4.6 Private Bus Boardings

Use of express bus service varied widely in the corridor during reconstruction, but overall, declined slightly during the two-year reconstruetion period. Reasons for this include:

- Improvements made to other high occupancy modes may have attracted express bus users.

- On certain routes where ridership gains were found following the start of reconstruction some new riders were previously Expressway auto users, and other were attracted from less conveniently scheduled bus services.

- Daily and seasonal variations contributed to the mixed results.

- The single day ridership survey intially made may have been insufficient for evaluating "before'" and "during" comparisons due to the fluctuations in ridership that occur daily,

1.4.7 Commuter Rail Service

Improvements to commuter rail service at a two-year project cost of $3.6 million were the second most expensive aspect of the corridor management plan. First-year surveys found that the improvements made on four lines netted the system close to 370 riders per day. Second-year estimates of new riders were higher at 420 per day.

Ninety percent of those influenced by the reconstruction to switch to commuter rail indicated the switch necessitated a change in commuting schedule to use the service: and close to 95 percent of these indicated long-term intentions to continue using the service.

1.4.8 Ridesharing

The response to an aggressive Vanpool and Carpool marketing strategy was disappointing. Expressway automobile occupancy during the reconstruction project declined.

1.5 PROGRAM COSTS

The contract required the contractor to provide at a minimum:

- -Police patrols and traffic details,
- -24.hour tow truck service,
- -Communications center,
- -Operation of the reversible lane configuration through positioning and repositioning temporary median barriers,
- -Barrier screens at work sites,
- -Impact attenuation devices, and
- -Participation in an incentive/disincentive clause.

Expenditures on these items reached $10.2 million due primarily to higher than anticipated enforcement costs. Notably the incentive/disincentive clause had an insignificant impact on the contract amount and the work was finished on schedule.

Other related costs were incurred in addition to the contract for off-site mitigation measures, including:

- o Fringe Parking
- o Vanpooling
- o Alternate Routes and Enforcement
- o Public Information
- o Aid to Affected Communities
- o MBTA Commuter Rail
- o MBTA Private Bus Service
- o MBTA Commuter Boat
- o MBTA Red Line and Feeder Bus Service
- o BAT Feeder Bus Service

The cost of these provisions totalled $8.3 million. Cost savings were possible through cutbacks in unessential services after the first three month evalution period. The Federal Highway Administration provided funding for vanpooling, alternate route improvements public information, commuter rail, and one express bus service.

1.6 RECOMMENDED STRATEGY

This project illustrated several important characteristics of a successful strategy to minimize disruption during major reconstruction projects, The responsible agency must clearly identify objectives, strategies, and implementation policies which are realistic and satisfactory to the agency and communities involved. The plan must be flexible in its implementation to allow the removal of ineffective actions in a-timely manner. In addition, an institutional mechanism for coordinating the action of numerous agencies must be established. With regard to information, a program of data collection is needed to provide the information necessary to modify strategies and to answer questions that will surely arise from affected communities and the media. Perhaps most importantly, a comprehensive community relations/media program is essential to the success of any program to minimize disruption.

With regard to the success of individual plan elements, this project showed that concern for traffic flow through the construction site should be a primary element of pre-project planning. The use of the reversible lanes during the peak hours was an effective means of minimizing travel disruption. These lanes, along with effective signing, towing, and public information, were critical to the success of the project. The most cost effective, off-site actions were the improvements made to the alternate routes, including traffic signals, pavement markings, and police presence, Less effective, and yet considered important to the overall strategy of providing options to Expressway users, were the improvements to public transportation and the park and ride Lots. These latter actions, however, represent permanent improvements to the corridor transportation system which will exist long after the reconstruction project is ended.

Perhaps the most important lesson learned from the Southeast Expressway reconstruction experience is that, even with the tradeoff of potentially delaying project completion, an effective corridor traffic management program is critical to the success of large-scale reconstruction efforts.

NEW YORK CITY · EAST RIVER BRIDGES

FINAL REPORT

TRANSPORTATION SYSTEMS MANAGEMENT

Mitigation Program Overview
New York City's East River Bridge Crossings

New York City Department of Transportation
May 1986

This report summarizes the various Transportation System Management (TSM) measures used to mitigate the impact of major reconstruction on New York City's four East River bridges (the Brooklyn, Manhattan, Williamsburg and Queensboro). It shows how the application of TSM measures at these facilities was complicated as a result of the unique corridor formed by the four free crossings, the three toll crossings, the FDR Drive on the west, and the Brooklyn-Queens Expressway on the east (see figure l-l). Due to the traffic flow interrelationship among these facilities, it became necessary to institute the TSM concept throughout the system as a whole.

In addition, this report describes how this bridge reconstruction program has changed the TSM development process. While in the past TSM remedies were implemented in response to traffic flow concerns caused by construction, they are now incorporated into the individual contracts, thereby minimizing construction impacts at the outset or over a limited time with minor modifications.

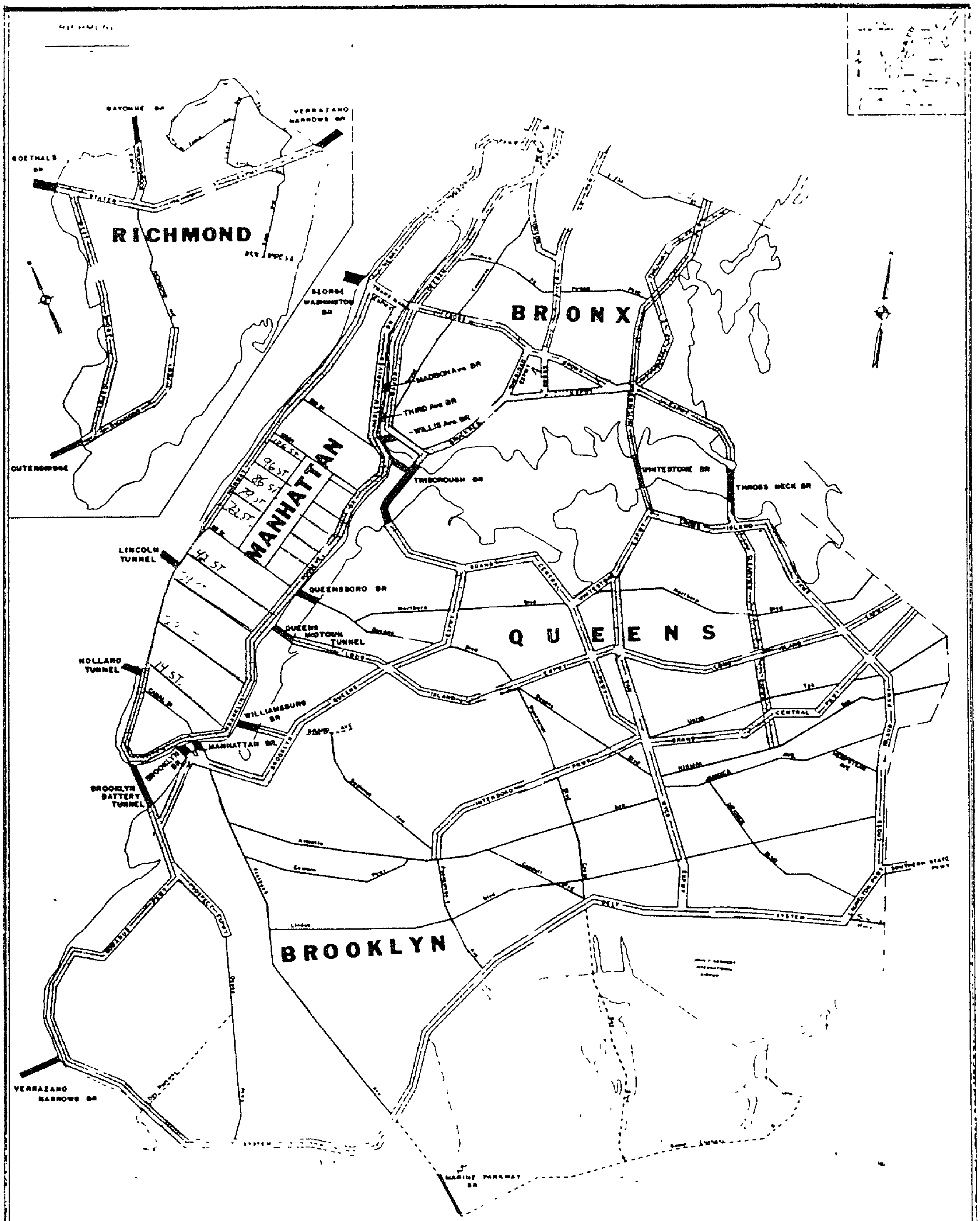

FIG. 1-1 MANHATTAN CBD ACCESS

CORRIDOR DESCRIPTION

New York City's Central Business District (Manhattan south of 96th Street) has six East River crossings which connect it directly to Brooklyn and Queens. A seventh, the Triboro Bridge located immediately north (at 125th Street), provides access to the CBD from Queens and the Bronx via the FDR Drive (a limited access expressway). These facilities are shown in Figure 2-1 and are outlined below.

City-Owned Bridges (Free)

- Brooklyn Bridge
- Manhattan Bridge
- Williamsburg Bridge
- Queensboro Bridge

Triborough Bridge and Tunnel Authority (TBTA) Crossings (Toll)

- Queens-Midtown Tunnel
- Brooklyn-Battery Tunnel
- Triboro Bridge

Figure 2-2 shows the lane availability at each crossing.

Factors which affect vehicular trips in this corridor are cost and the physical characteristics of an individual facility. For example, the Queensboro Bridge carries a disproportionate share of the Queens-Manhattan traffic because it is the only free crossing between these two boroughs. Similarly a segment of the

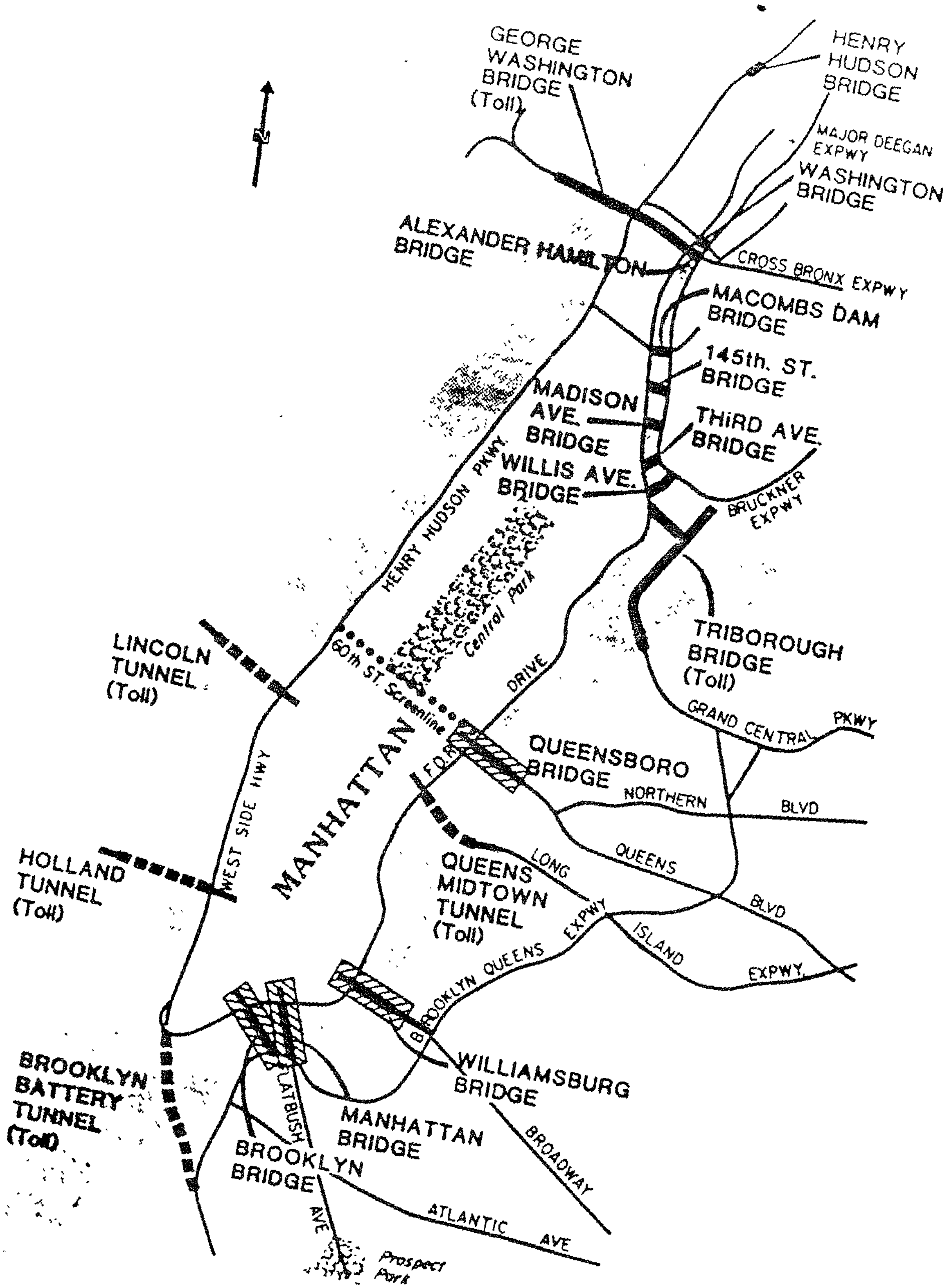

FIG. 2-1

EAST RIVER CORRIDOR

LANE AVAILABILITY

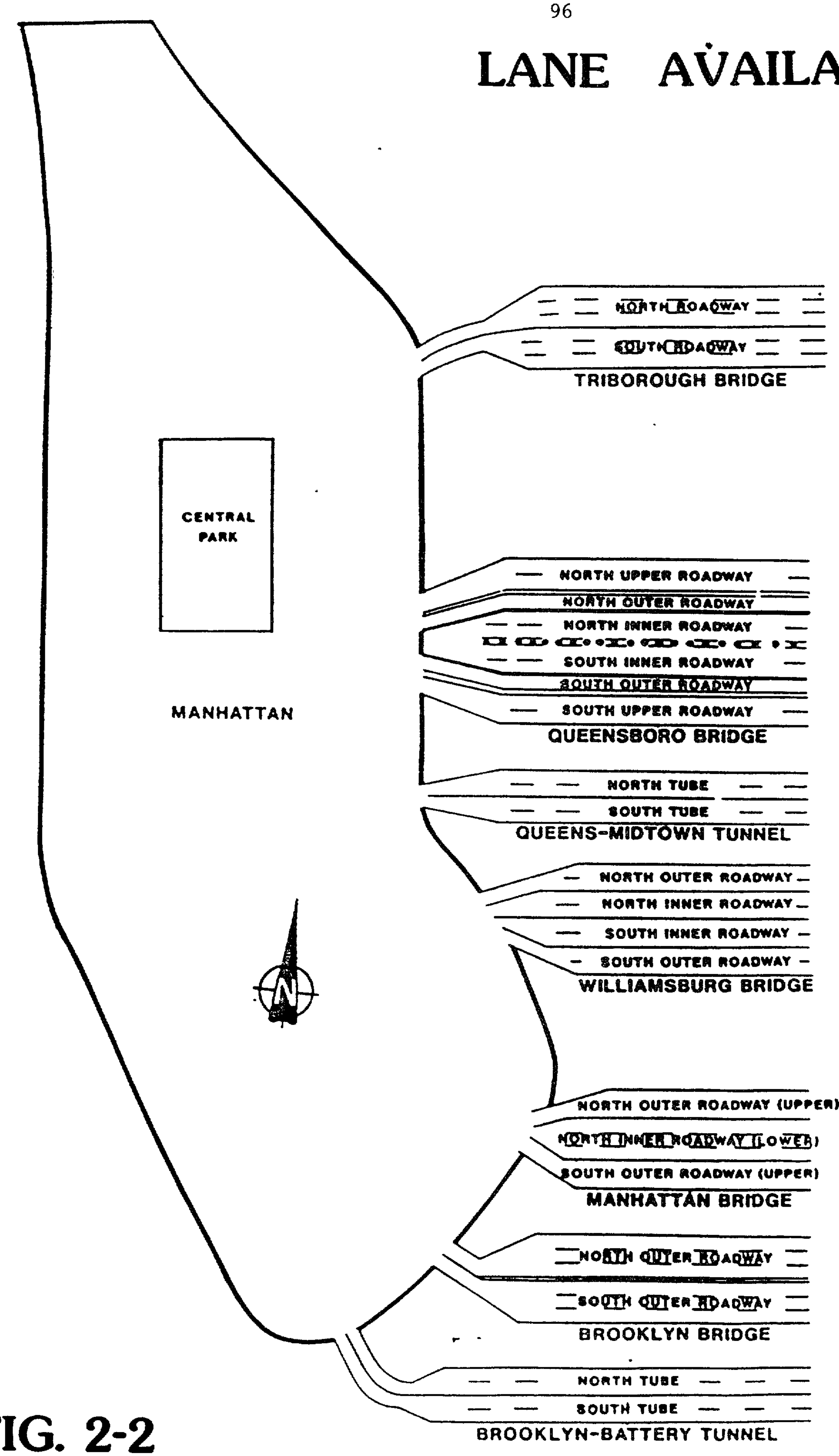

FIG. 2-2

Brooklyn-Queens Expressway connecting the Brooklyn-Battery Tunnel with the Brooklyn and Manhattan Bridges, normally operates at capacity as motorists bypass the tunnel, enduring a significant delay to avoid a modest $1.75 toll. In addition, while the TBTA facilities can accommodate all types of vehicles, this is not the case with the four, city-owned facilities. Truck traffic is not permitted on the Brooklyn Bridge and at the Williamsburg and Queensboro Bridges, trucks may only use designated roadways due to clearances or weight restrictions.

In all, this corridor is characterized by heavy volumes during the major part of each day, offers a variety of crossing accommodations, and carries a larger than average percentage of commercial traffic.

DEVELOPMENT OF THE TSM PROCESS

The development of a rational TSM planning process began with the impacts caused by the closing of the Brooklyn bound (eastbound) outer roadway on the Williamsburg Bridge. This not only substantiallly reduced the capacity of this facility but it also required the diversion of all eastbound truck traffic due to inadequate horizontal and vertical clearances on the remaining inner roadway.

The mitigating measures originally planned were limited to the assignment of intersection officers to direct traffic and the erection of advance warning signs advising trucks to use the Manhattan Bridge. Very quickly it was found that these measures were insufficient to accommodate the widespread impacts, particularly during the afternoon and evening peak hours. Queues from the Williamsburg Bridge extended down to the nearest alternate, the Manhattan Bridge, as the approaches to both bridges were jammed. In addition the Queens-Midtown Tunnel, located more than three miles to the north, was also severely impacted. The PM outbound volumes would begin building at 2PM and not subside until after 8PM. The average daily traffic rose by nearly 31% at the tunnel.

After this unanticipated congestion occurred, the first true TSM measures, lane reversals at both the Queens Midtown Tunnel and the Manhattan Bridge, were initiated in November, 1981. A lesson was clear; careful advance planning was required since changes of this magnitude could not be handled by reaction. While we found that this roadway closing on the Williamsburg Bridge produced a significant impact throughout the East River corridor, plans for additional lane closings within this corridor, sometimes simultaneously, indicated a co-ordinated, preplanned effort was needed.

It was with this setting that TSM became a part of the solution to minimize the impact of reconstruction. A detailed description of the elements used at each facility can be found in the appendices.

TSM MEASURES CONSIDERED AND SELECTED

MEASURES CONSIDERED

The TSM techniques employed on the East River corridor can be grouped into one of three broad categories: engineering, enforcement or education. All of the measures considered are listed below by group with an asterisk indicating those implemented.

ENGINEERING

Encompassed not only traditional measures, such as lane reversals, signal improvements, sign changes, etc., but also some measures tailored for a specific site.

- Traffic Barriers*
- Metering/Access Control
- One-Way Street Conversion
- Reversible (Contraflow) lanes*
- Access Ramp Crossover*
- Driver-Only Ban
- Turn Prohibitions*
- HOV Lanes
- Installation/Widening of Lane/Shoulder*
- Channelization, Striping, Lane Markings*
- Guide Rails, Guard Rails, Lane Dividers, Probes*

- Introduction/Elimination of Phases*
- Timing Changes*
- Advance Warning Signs*
- Additional Traffic Regulation Signs*
- Electronic Variable Message Signs*
- Bike Bus*

ENFORCEMENT

Included functions such as intersection control and vehicle and traffic law enforcement, in addition to innovative monitoring and road service mechanisms.

- Bridge Cars*
- Tow Service*
- Alternate Route Implementation*
- Intersection Control*

EDUCATION

In addition to the usual mechanisms (press release and other media contact) these efforts were expanded to include direct user outreach.

- Motorist Information Flyers*
- Media Coverage*
- Press Releases*
- Weekly Traffic Alert*

MEASURES SELECTED

As previously indicated, the initial TSM measures chosen were based on observations and analyses of data collected after construction commenced. However, when the planning began for future concurrent East River Bridge reconstruction, it became necessary to compare data on current and anticipated average speeds and volumes. In selecting TSM measures to mitigate the construction impacts we found that the most effective solutions combined engineering, enforcement and educational elements. The engineering elements were designed to maximize the efficiency of the roadways which were not under construction by creating a balance between the available capacity and the vehicular demand. The enforcement elements helped maximize the available capacity by quickly responding to the vehicular stoppages, routing traffic to underutilized approaches, and controlling vehicular flow. The educational elements were successful in distributing traffic throughout the system by publicizing roadway conditions, recommending alternate routes and encouraging motorists to re-adjust their travel patterns.

To some degree, the selection of TSM measures for any particular facility is dependent upon the particular characteristics of the facility itself and the corridor in which it is contained. For this reason, some of the TSM measures considered were never implemented. For example, the primary access and egress routes to each of the four East River bridges is provided via the local street system.

Therefore, HOV lanes, ramp metering and other access control mechanisms were discounted because such measures would have added additional vehicular queuing on the local street network. Similarly, one-way street conversions were only employed in a limited manner (see Appendix A) where it was determined to be appropriate.

A further treatment considered was a driver-only ban during peak periods. While this measure would have encouraged carpooling, minimized vehicular volumes, and helped to spread peak arrivals, the courts have ruled that the City does not have the authority to regulate traffic based on vehicular occupancy. Therefore it was rejected.

RESULTS OF TSM MEASURES SELECTED

Methods of Evaluating Effectiveness

The TSM methods were most of ten evaluated by comparing "before" and "after" studies. These focused on the following parameters:

- Vehicular travel speeds
- Delay and queue measurements
- Vehicular volume counts (ADT and peak hours)

Volumes were analyzed not only for individual segments, but also within the corridor as a whole. Speeds were measured throughout the day to identify both peak and off-peak impacts as well as any lengthening in the duration of peak periods.

Further, while not calculated separately, accident reduction, delay minimization and driver/passenger comfort and convenience are expressed by the travel time changes and delay measurements.

Effectiveness of TSM Measures Employed

The effectiveness of the various TSM measures employed at each of the four facilities is detailed in depth in Appendices A through D. This chapter will summarize two of the most significant results.

As was discussed in Chapter 3 construction on the Williamsburg Bridge generated unanticipated congestion not only at that facility but also at the two adjacent crossings, the Manhattan Bridge and the Queens-Midtown Tunnel. Examining the latter we found. that its ADT rose by nearly 31% from 33,700 to 44,100 vehicles and congestion increased dramatically on the local street network in its vicinity. Speeds as low as 0.8 mph were recorded during the peak hours on 36th Street, a major approach route from the west. The development of a comprehensive TSM program which included lane reversals at both the above mentioned facilities, resulted in substantial improvements. These were most evident along the approaches to the Queens Midtown Tunnel and are shown in the tables 5-l and 5-2.

Summarizing the tables, it can be seen that travel times improved on the East/West approach streets by as much as 95 percent and all tunnel-related queues were eliminated from these crosstown streets. This reflected a significant improvement from the "before" condition, when queues could extend as far west as 6th Avenue. The North/South Avenues approaching the tunnel also benefited by the lane reversal project. Here too, all tunnel-related queues were eliminated and through-traffic levels of service were superior. Travel times on these four avenues experienced marked reductions with up to a 60 percent improvement recorded.

A comprehensive TSM approach also helped minimize the construction impacts at the Queensboro Bridge, which since 1981 has undergone the most extensive rebuilding program of any of the four East River Bridges.

Table 5-1

QUEENS-MIDTOWN TUNNEL

MANHATTAN APPROACH: AVERAGE TRAVEL SPEEDS/TIMES

STREETS: BETWEEN 1ST AVENUE AND LEXINGTON AVENUE

"Before" and "After" Analyses

	34TH STREET (W/B)				34TH STREET (E/B)				35TH STREET				36TH STREET(3)				37TH STREET			
TIME OF DAY(P.M.)	Before	After	Difference	Percent Difference	Before	After	Difference	Percent Difference	Before(1)	After(2)	Difference	Percent Difference	Before	After	Difference	Percent Difference	Before	After	Difference	Percent Difference
Average Travel Speeds (mph)																				
3:00-4:00	4.4	8.0	+3.6	+82	4.4	8.3	+3.9	+ 89	7.5	12.0	+ 4.5	+ 60	6.2	6.8	+ .6	+ 9	5.8	8.0	+2.2	+ 38
4:00-5:00	5.8	8.6	+2.8	+48	3.1	6.9	+3.8	+123	5.5	17.1	+11.6	+210	3.4	5.7	+ 2.3	+ 68	4.1	3.8	+ .3	+ 7
5:00-6:00	4.2	8.0	+3.8	+90	3.8	7.0	+3.2	+ 84	4.1	8.0	+ 3.9	+ 95	1.4	6.0	+ 4.6	+329	3.0	6.0	+3.0	+100
6:00-7:00	7.5	10.9	+3.4	+45	4.1	8.0	+3.9	+ 95	3.6	24.0	+20.4	+567	2.4	6.3	+ 3.9	+163	3.8	7.3	+3.5	+ 92
Average	5.5	8.6	+3.1	+56	3.9	7.5	+3.6	+ 92	5.2	13.3	+ 8.1	+156	2.8	6.2	+ 3.4	+121	4.2	3.8	+ .4	+ 10
Average Travel Times (Minutes)																				
3:00-4:00	4.1	3.0	-1.1	-27	4.1	2.9	-1.2	- 29	1.6	1.0	- .6	- 38	7.7	6.2	- 1.5	- 20	3.1	3.0	- .1	- 3
4:00-5:00	3.1	2.8	- .3	-10	5.9	3.5	-2.4	- 41	2.2	.7	- 1.5	- 42	11.7	7.7	- 4.0	- 34	4.4	3.5	- .9	- 20
5:00-6:00	4.3	3.0	-1.3	-30	4.7	3.4	-1.3	- 28	2.9	1.5	- 1.4	- 48	30.4	6.7	-23.7	- 78	6.1	4.0	-2.1	- 34
6:00-7:00	2.4	2.2	- .2	- 8	4.4	3.0	-1.4	- 32	3.3	.5	- 2.8	- 85	17.2	7.0	-10.2	- 59	4.7	3.3	-1.4	- 30
Average	3.5	2.9	- .7	-20	4.8	3.2	-1.6	- 33	2.5	.9	- 1.6	- 64	16.9	6.9	-10.0	- 59	4.6	3.5	-1.1	-24

(1) 35th Street between 2nd Avenue and Lexington Avenue westbound.
(2) 35th Street between 2nd Avenue and 3rd Avenue eastbound.
(3) 36th Street between 1st Avenue and 6th Avenue.

Table 5-2

QUEENS-MIDTOWN TUNNEL

MANHATTAN APPROACH: AVERAGE TRAVEL SPEEDS/TIMES

AVENUES: BETWEEN 23RD/34TH STREETS (N/B) AND 42ND/34TH STREETS (S/B)

"Before" and "After" Analyses

TIME OF DAY (P.M.)	1ST AVENUE (N/B) BETWEEN 23RD/34TH STREETS				2ND AVENUE (S/B) BETWEEN 42ND/34TH STREETS				3RD AVENUE (N/B) BETWEEN 23RD/34TH STREETS				LEXINGTON AVENUE (S/B) BETWEEN 42ND/34TH STREETS			
	Before	After	Difference	Percent Difference	Before	After	Difference	Percent Difference	Before	After	Difference	Percent Difference	Before	After	Difference	Percent Difference
Average Travel Speeds (mph)																
3:00-4:00	8.2	8.3	+.1	+ 1	10.0	16.0	+6.0	+60	13.8	16.5	+2.7	+ 20	13.3	17.1	+3.8	+29
4:00-5:00	4.4	4.7	+.3	+ 7	10.9	12.0	+1.1	+10	4.3	9.4	+5.1	+119	14.1	15.0	+ .9	+ 6
5:00-6:00	5.2	5.5	+.3	+ 6	15.0	16.0	+1.0	+ 7	5.4	8.3	+3.9	+ 72	12.6	14.1	+1.5	+12
6:00-7:00	11.6	11.8	+.2	+ 2	13.3	16.0	+2.7	+20	6.9	16.5	+9.6	+139	14.1	17.1	+3.0	+21
Average	7.4	7.6	+.2	+ 3	12.3	15.0	+2.7	+22	7.6	11.4	+3.8	+ 50	13.5	16.0	+2.5	+19
Average Travel Times (Minutes)																
3:00-4:00	4.6	4.0	-.6	-13	2.4	1.5	- .9	-38	2.6	2.0	- .6	- 23	1.8	1.4	- .4	-22
4:00-5:00	8.1	7.0	-.9	-11	2.2	2.0	- .2	- 9	8.4	3.5	-4.9	- 58	1.7	1.6	- .1	- 6
5:00-6:00	6.3	6.0	-.3	- 5	1.6	1.5	- .1	- 6	6.7	4.0	-2.7	- 40	1.9	1.7	- .2	-11
6:00-7:00	3.1	2.8	-.3	-10	1.8	1.5	- .3	-17	5.2	2.0	-3.2	- 62	1.7	1.4	- .3	-18
Average	5.5	5.0	-.5	- 9	2.0	1.6	- .4	-20	5.7	2.9	-2.8	- 49	1.8	1.5	- .3	-17

A good indicator of its effectiveness is a comparison of the average daily traffic on the Queensboro Bridge and its adjacent river crossings. These are shown below in Table 5-3.

TABLE 5-3: AVERAGE DAILY TRAFFIC VOLUMES / 1980 - 1984

Year	Queensboro Bridge	Queens Midtown Tunnel	Triboro Bridge
1980	127,900	73,200	88,400
1981	127,900	81,200	93,400
1982	136,800	‘8,200	88,100
1983	125,200	78,100	93,000
1984	134,100	74,800	95,200

As is shown, volumes on the Queensboro Bridge have experienced an upward trend throughout the reconstruction period, increasing on the average by approximately .5 percent per year. This nearly equals the overall growth at the adjacent facilities despite the fact that construction has eliminated one lane completely and required the closing of two lanes for nearly two years.

CHICAGO- EDENS EXPRESSWAV

THE EDENS EXPRESSWAY PROJECT

Sigmund C. Ziejewski
District Engineer

Illinois Department of Transportation
Division of Highways/District 1

THE EDENS EXPRESSWAY** PROJECT

By Sigmund C. Ziejewski*

In October 1980 we completed a 3 year project involving the major reconstruction of a 15 mile portion of Interstate.Route 94 locally known as the Edens Expressway. Originally constructed by the Cook County Highway Department, this section of the Chicago Metropolitan Expressway System located in the northern suburbs of Chicago was opened to traffic on December 20, 1951, A 6 lane facility with interchange spacing varying from 1 to 2 miles, it carries an average daily traffic varying from 135,000 vehicles at its southern terminus with Interstate Route 94 (Kennedy Expressway) to 57,000 vehicles at the Lake-Cook County line.

It is certain that the planners who designed this roadway in the 1940's did not anticipate these heavy traffic demands. In the 28 years that the pavement had been in service, it had experienced traffic loadings equivalent to over 40 years of theoretical life. In 1966 the Edens Expressway had the distinction of being the first major urban interstate highway to warrant resurfacing and it received a 3 inch bituminous overlay. At that time it was anticipated that an additional 1½ resurfacing in 1976 would maintain the pavement integrity.

In 1977 when the Edens Expressway was again being evaluated for maintenance needs, a determination was made that a major expansion in the scope of the rehabilitation work must be considered. The roadways and bridges had suffered extensive deterioration, the original drainage facilities based on a 10 year storm intensity were inadequate causing frequent closings due to flooded viaducts, superelevation designs did not meet current criteria and were not correctable with asphalt overlays, satisfactory vertical clearances could not be maintained with the magnitude of resurfacing required, median guardrail maintenance required frequent daytime lane closures with resulting congestion and annual maintenance costs were averaging $860,000. Another important influence was the fact that only rehabilitation efforts which incorporated the latest design and safety standards could qualify for federal funding. Without substantive federal funding, this project would not have been possible.

---

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**Edens Expressway by AASHTO definition is a freeway. Expressways and freeways are used interchangeably in the text.

After full review of the design alternatives, it was decided to remove the old pavement and construct a 10 inch continuously reinforced concrete pavement, In addition, a supplemental main drain would be added, shoulders would be reconstructed, bridges would be redecked, a concrete barrier wall would replace the median guardrail, acceleration and deceleration lanes would be lengthened and signing, lighting and traffic surveillance equipment would be modernized. With this goal our traffic engineering challenge was to develop and implement a plan for expeditious project accomplishment providing a safe environment for drivers and construction workers with a minimum of public inconvenience.

Traffic Control Plan

Traffic control planning for the Interstate Route 94 (Edens Expressway) actually began in 1966 when it was first resurfaced. As this project represented our first experience in dealing with urban interstate reconstruction which affected high traffic volumes, basic traffic planning procedures were developed which recognized the area-wide traffic impact of such expressway projects. Our evaluation of the various traffic control alternatives for expeditiously completing such work attempted to minimize traffic corridor impact while maximizing work area availability. Since this first interstate rehabilitation project in 1966 we had resurfaced the Eisenhower Expressway (I-290) in 1968, the Calumet Expressway (I-94) in 1969, the Kennedy Expressway (I-94) and Dan Ryan Expressway (I-90, 94) in 1971. These traffic facilities accommodated daily traffic volumes ranging from 125,000 to 240,000 vehicles and the resulting traffic diversions during construction required continuing analysis because of public impact and media attention.

The traffic engineering task was to develop a traffic control plan that considered the following factors:

- Motorist and workmen safety . .
- Motorist delay in both time and money
- Traffic control costs
- Extent of work area required for construction
- Traffic volumes on the mainline and ramps
- Continuity and simplicity of traffic controls
- Access for emergency vehicles

- Available alternate routes and public transportation service

- Local law enforcement agencies" capability of controlling traffic

- Prevailing speed of traffic

- The number and location of existing ramps

- Methods of communicating traffic control information to motorists

Although no formula was established for individually evaluating these factors, consideration was given to each, based on experience and knowledge obtained over the last 13 years of planning major expressway projects. It was theorized that six basic traffic control plan alternatives were feasible for consideration:

- Full closure

- Closure of 1/2 of the roadway to provide for only one direction of traffic. flow

- Two way traffic flow on one of the3 lane roadways

- Shoulder use as a traffic lane

- Lane closures in work areas only

- A combination of alternatives

Because of insufficient arterial street capacity in the Edens Expressway corridor and the anticipated motorist delay cost for 135,000 daily users, the "full closure" and "directional closure" alternatives were determined not feasible.

The "lane closure in work areas only" was impractical as well, due to the complexity of the reconstruction operations and the desire to minimize the construction period. It was agreed that utilization of a "combination of reverse flow and shoulder use" was the best traffic control option since it provided:

- for motorist safety by using a physical barrier to separate traffic in opposite directions

- the greatest construction worker safety because all traffic was physically restricted from the work area by the median guardrail

- the largest work area for construction equipment movement and the only alternative that allowed work on 3 lanes of pavement at one time

- and finally the traffic controls were simple and easily understood

The decision to reconstruct one directional 3 lane roadway at a time and utilize the other roadway for 2 way traffic service (by upgrading the shoulder) resulted in a 3 year construction schedule beginning in 1978 (See Figure 1). In the first year over $19.4 million was expended just to prepare for the major roadway reconstruction in 1979 and 1980 (Figure 2 shows 1980 Phasing). Contracts were awarded to upgrade the right shoulder of the southbound roadway which would become the fourth lane and install 15 miles of temporary lighting on wooden poles. Fifteen miles of temporary concrete barrier wall (10 foot sections weighing 4000 lbs. each) were fabricated and site delivered. In addition, contracts were performed to upgrade the highway drainage system to a 50 year storm frequency by pipe oversizings to increase system retainage. Utility facilities were relocated by additional contract work.

Based on our past urban interstate reconstruction experience, the following traffic planning actions were initiated prior to the Edens Expressway Reconstruction Project start:

- Traffic engineers participated in a District Expressway Task Force with representatives from the Bureaus of Maintenance, Design, Construction, Programming, Traffic Systems Center and Electrical. Their assignment was to develop the initial project schedule.

- Major highway agencies which would be affected by the Edens Expressway Reconstruction Project - Illinois Toll Highway Authority, Cook County Highway Department, and the City of Chicago Public Works Department were informed of the general project details and proposed schedule. This was to assure that alternate routes operated by these agencies would be available during the duration of the project. Of particular concern was the Tri-State Tollway (Interstate Route 294) which was one of the recommended diversion routes (See Figure 3).

EDENS EXPRESSWAY: TRAFFIC STAGING

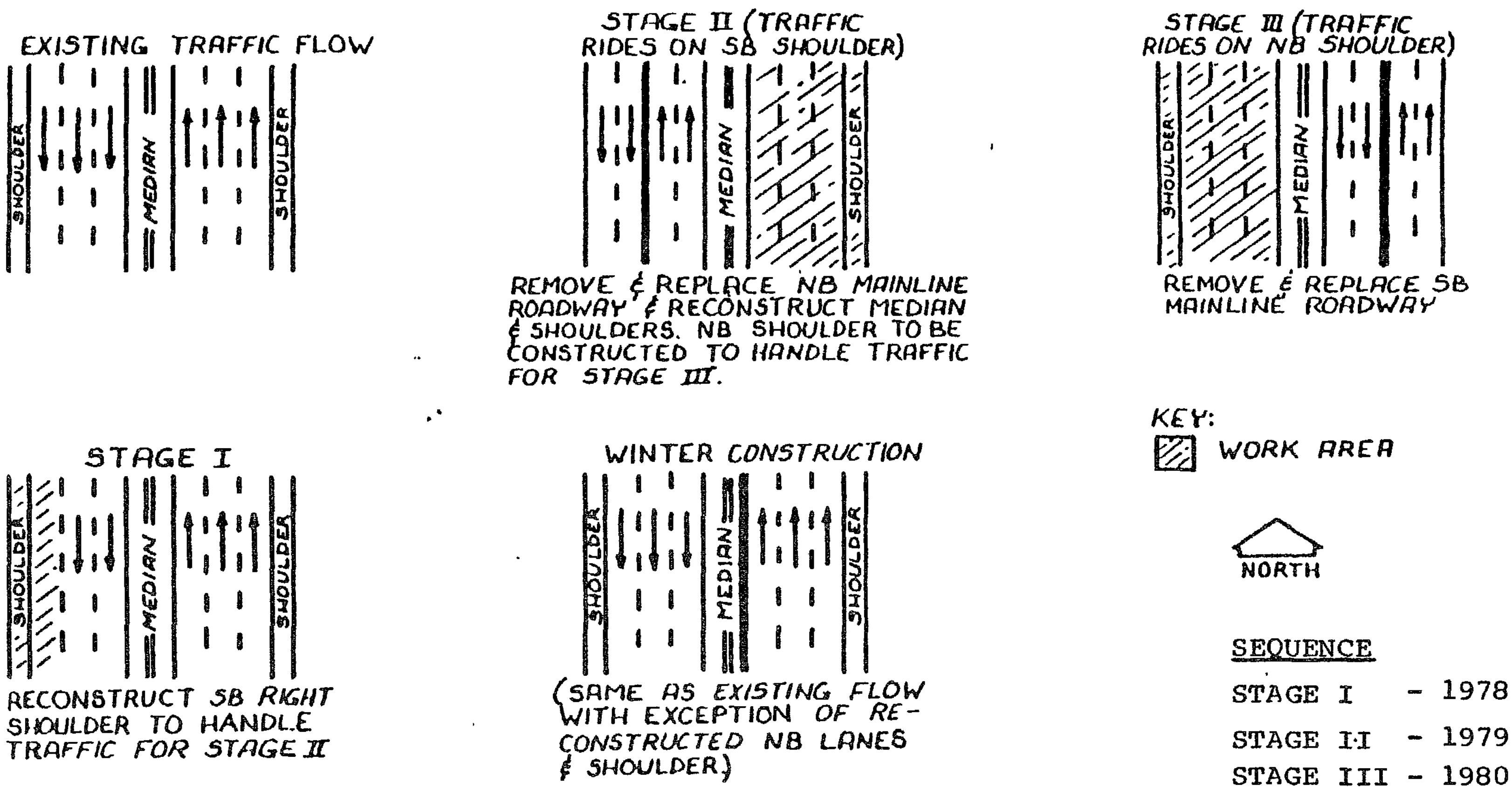
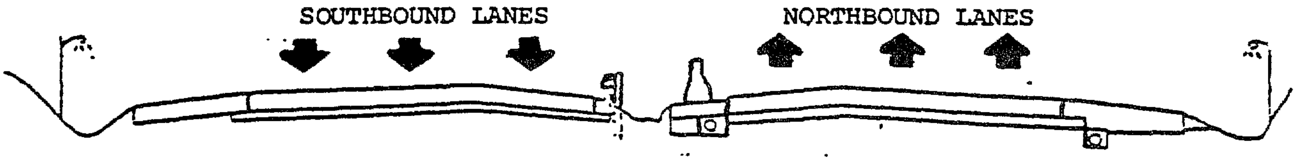


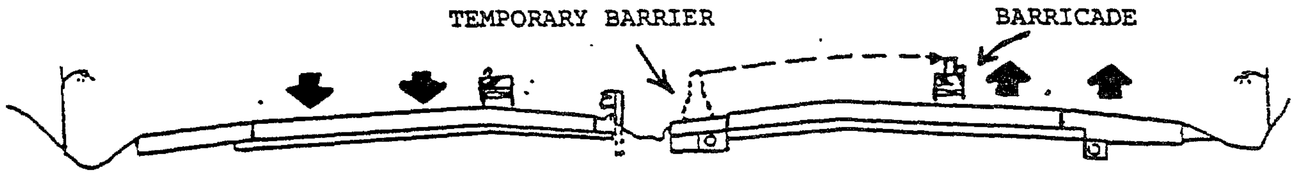
FIGURE 1

1980 CONSTRUCTION STAGING FOR EDENS EXPRESSWAY

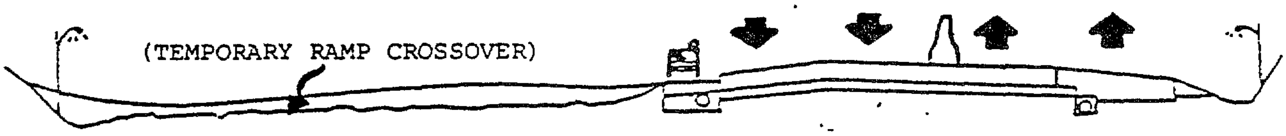
(CROSS-SECTION VIEW LOOKING NORTH)



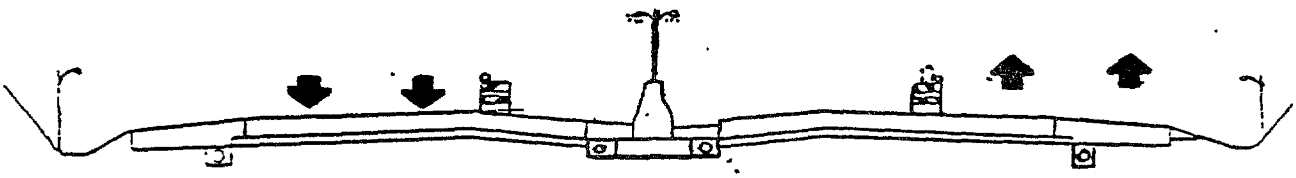
OPEN : UNTIL APRIL 27



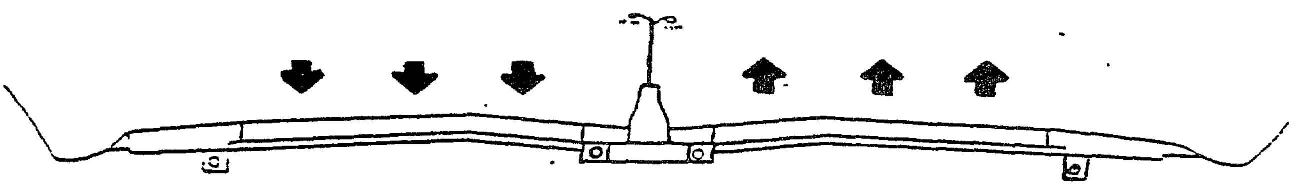
PHASE 1: APRIL 27 to MAY 5
(SOUTHBOUND LANES FULLY CLOSED MAY 4)



PHASE 2 : MAY 5 to AUGUST 1 (GOLF ROAD TO KENNEDY EXPRESSWAY)
MAY 5 to SEPTEMBER 7 (CLAVEY ROAD TO GOLF ROAD)



PHASE 3 : AUGUST 1 to OCTOBER 31 (GOLF ROAD TO KENNEDY EXPRESSWAY)
SEPTEMBER 7 to OCTOBER 31 (CLAVEY ROAD TO GOLF ROAD)



FINAL : ALL WORK COMPLETE OCTOBER 31

FIGURE 2

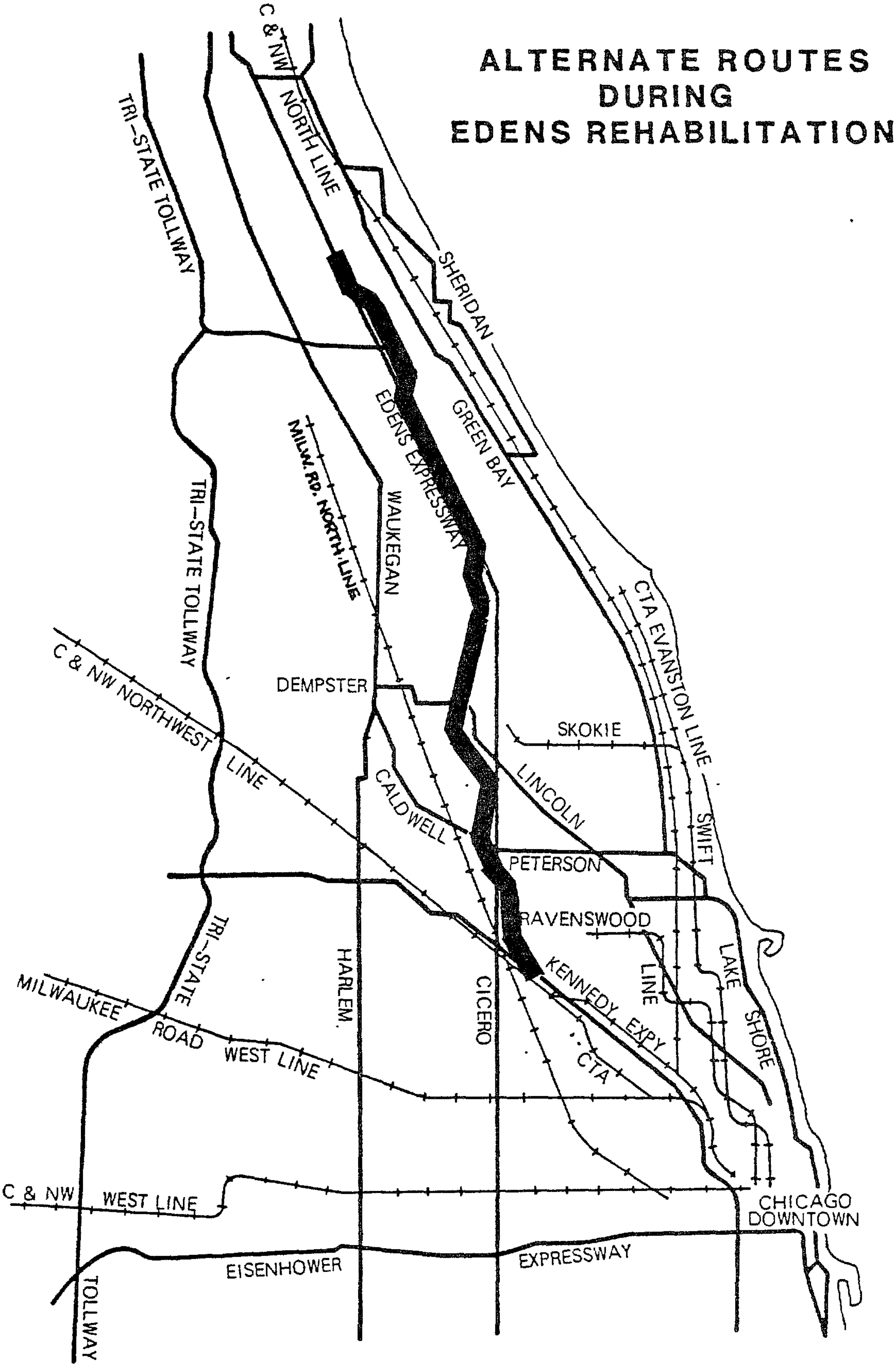

ALTERNATE ROUTES
DURING
EDENS REHABILITATION
C & NW NORTH LINE
TRI-STATE TOLLWAY
SHERIDAN
GREEN BAY
EDENS EXPRESSWAY
MILW. RD. NORTH LINE
WAUKEGAN
CTA EVANSTON LINE
C & NW NORTHWEST LINE
DEMPSTER
SKOKIE
CALDWELL
LINCOLN
SWIFT
PETERSON
RAVENSWOOD
LINE
LAKE
SHORE
TRI-STATE
HARLEM
CICERO
KENNEDY EXPY
CTA
MILWAUKEE ROAD WEST LINE
C & NW WEST LINE
CHICAGO DOWNTOWN
EISENHOWER
EXPRESSWAY
TOLLWAY

FIGURE 3

. The project schedule and expected impact was discussed regularly at the bi-monthly meetings of the Transportation Operations Committee which is part of the Transportation System Management effort for Northeastern Illinois. This committee is comprised of members from the transit, highway and the private sector.

. Inter-agency meetings with municipality public works, enforcement and fire department representatives were arranged to inform them of the project details, communication links expected problems and identification of possible conflicting road work on detour routes.

. Informal briefings on the planned project traffic controls and communications were held with the District Communications Center supervisors and dispatchers, Emergency Traffic Patrol supervisors, Traffic Systems Center personnel, and Bureau of Maintenance engineers. The purpose of these meetings was to assure a full project understanding by all operational personnel who would have a daily responsibility for communications with agency personnel, the general public and news media.

* Special individual project and traffic control briefings were given to the radio station personnel who regularly broadcasted daily peak period traffic reports.

. Special advance signing was erected on the northbound and southbound approaches to the Edens Expressway two weeks in advance of project start indicating "Edens Repairs Begin April 27 - Only Two Lanes Open".

. Arrangements were made to display project start alert messages on two commercial changeable message advertising signs adjacent to the Kennedy Expressway two weeks in advance of the project start.

. Two special signs were erected prior to the project start to encourage ridesharing and to publicize the Regional Transit Authority telephone number where a motorist could obtain routing information on mass transit service alternates.

- Special informational meetings were held with representatives of the Division of Public Transportation and Regional Transit Authority to discuss the project traffic impact, schedule and provide estimates of expected diversions to mass transit. Plans were also reviewed for additional commuter parking at stations which would be impacted by the project.

The preceding actions were taken in advance of the project start. Though many meetings were involved with outside agencies, it was felt that the information interchange provided a fuller perspective to the agencies affected by the project and allowed a valuable critique of the traffic control plans. out of these meetings came suggestions which were adopted including placing reference numbers every l/10 mile on the median temporary concrete barrier wall so that emergency equipment could be more accurately dispatched, providing emergency agencies with keys to pedestrian fence gates so that emergency access could be facilitated, and obtaining a commitment for helicopter evacuation of injured by the Chicago Fire Department (within the City of Chicago) and the U.S. Coast Guard unit stationed at nearby Glenview Naval Air Station. There was a deep concern expressed at these meetings by police and fire personnel regarding access to accident scenes or disabled vehicle locations because of the lack of shoulders and continuous frontage roads.

An important development-from these pre-construction coordination meetings was initiation of a motorcycle paramedic service by the Village of Northfield (located adjacent to the Edens Expressway). Anticipating difficulty in gaining access to the available lanes and the construction work zone, the village obtained a $10,000 grant from the Allstate Insurance Company Foundation. This grant funded the purchase of two motorcycles and basic life-support supplies for paramedic use. (Allstate Insurance Company headquarters are located in the Edens Expressway corridor and therefore the project affected their employees).

The operational responsibility for the Chicago Metropolitan Area Expressway System has required the development of special activities which are unique within IDOT and the nation. Because of the heavy traffic demands on the system which accommodates 25% of the metropolitan area vehicular travel and results in ADT's exceeding 200,000 in many sections and annual accident experience which exceeds 700 accidents/mile on some portions of the system, special techniques and operational units have been established. Implemented since 1961, there has been developed a three part coordinated traffic operational program for reducing congestion, increasing safety, conserving energy, expediting emergency responses, providing motorist aid, and public/media information. This operational program consists of

* the District Highway Communications Center which collects and disseminates traffic information and dispatches and coordinates needed services on a continuous basis.

- the Emergency Traffic Patrol fleet of radio equipped service trucks for handling traffic incidents and other operational problems.

- the Traffic Systems Center backbone electronic surveillance system for automatic traffic condition and incident detection monitoring and reporting.

These specialized activities proved invaluable during the Edens Expressway Reconstruction Project and their functions will be described individually as they relate to this project.

District Highway Communications Center

The Communications Center operates six radio channels, coordinates all traffic, maintenance and construction operations, including the Emergency Traffic Patrol fleet, and is staffed 24 hours-a-day, 7 days-a-week, Four 300 foot towers, 3 micro-wave links, ten base stations and over 800 mobile radios comprise the communications system. The Center personnel scan the "real time" map display and CRT terminal which reflect traffic conditions on over 100 miles of the Chicago Metropolitan Expressway System as detected by the Traffic Systems Center traffic sensors. This computer-generated expressway congestion information is also made available to commercial radio stations which provide their own remote teleprinters. In addition to these computer traffic information links, three commercial radio stations maintain direct telephone lines with the Center. As dependable communications are essential with other operational agencies, there are also direct lines to the Illinois State Police, Chicago Police Department, Chicago Fire Department, and Cook County Sheriff Police.

During the Edens Expressway Reconstruction Project special communications actions were initiated to expedite project information flow and increase our ability to respond to emergencies and to media inquiries

* a direct telephone line was installed to the prime contractor's office

- pocket radio pagers and portable two-way radios were issued to the state construction engineers assigned to the project

- radio communication links were established to the assigned project consultants

- live broadcasts regarding special project activities and incidents were provided by the communications dispatchers to the news media

- based on our meetings with local municipality enforcement agencies, the communication center notified local agencies affected 24 hours in advance of any construction ramp closures

- the Highway Advisory Radio System was operated utilizing Communication Center information

Emergency Traffic Patrol

Our 39 unit Emergency Traffic Patrol was formed in 1961 when we discovered that the urban expressways did not operate by themselves. our early experience with peak period congestion caused by accidents and disabled vehicles quickly indicated a response capability was necessary to assure safe and efficient roadway operation. Since 1962 our annual patrol effort has increased from 504,000 patrol miles and 18,700 motorist assists on 47 centerline miles patrolled to a 1979 total of 1,314,000 miles providing 78,900 assists on 100 centerline expressway miles. Acting as our operational "eyes and ears", the one man patrol provides traffic condition information in addition to an ability to relocate accident or disabled vehicles and clear debris. The radio equipped trucks carry fuel, water, flares, tools and other motorist aids and have towing capability (See Figure 4).

Normally on the Edens Expressway there was one patrol assigned during peak and off peak periods. Because of the tight geometrics and lack of continuous shoulder during the reconstruction, we felt very vulnerable to complete traffic stoppages. During the duration of the 1979 and 1980 reconstruction, three patrol units were assigned during peak periods and two during non peak. Volunteers were selected who would be assigned for the project duration to insure project familiarity, a thorough knowledge of the adjacent road system, and complete information on emergency service availability.

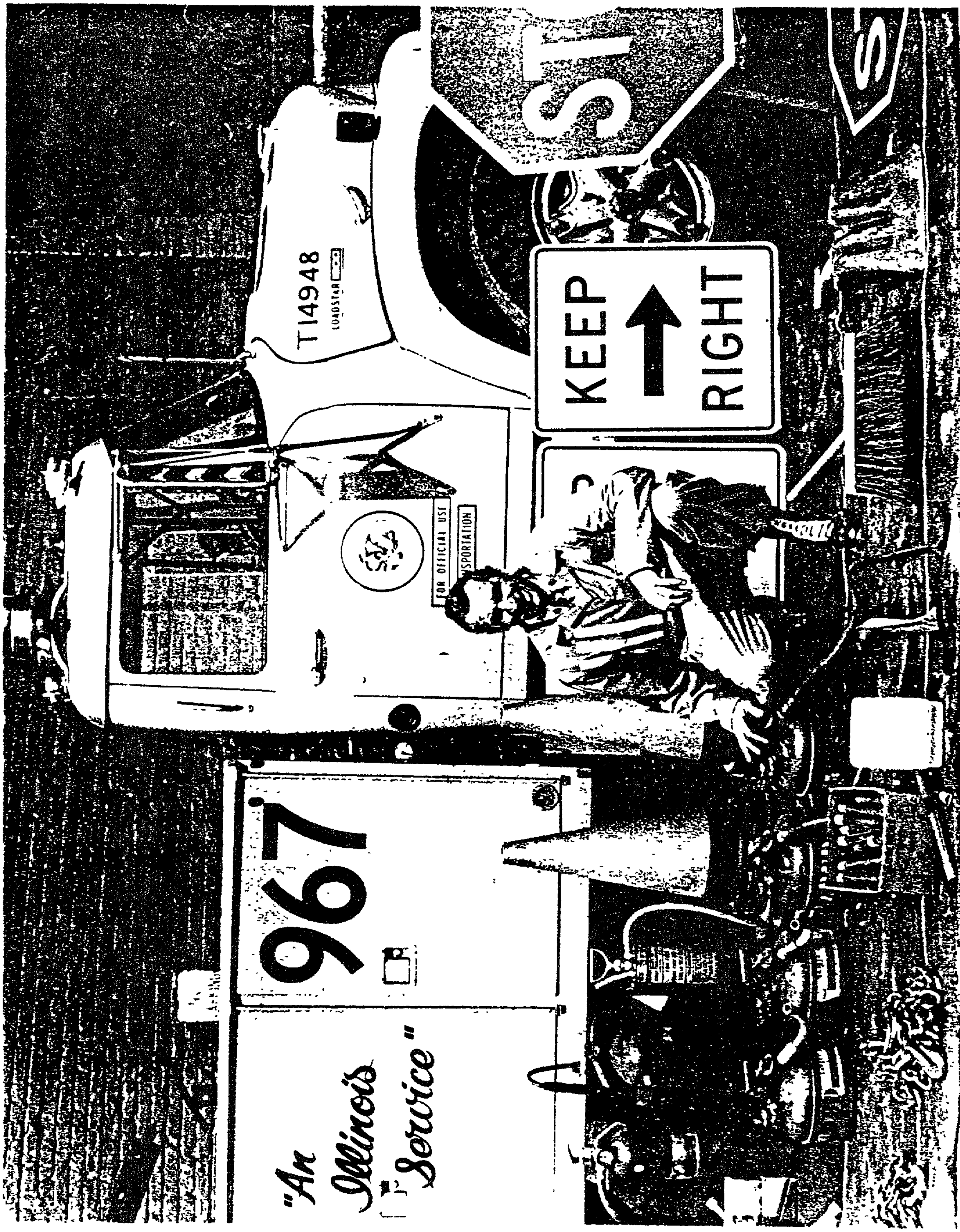

"An Illinois Service"
967
T14948
LOADSTAR
FOR OFFICIAL USE
SPORTATION
KEEP RIGHT

FIGURE 4

Special Emergency Traffic Patrol assignments as a part of the Edens Project included:

- checking contractor traffic controls, barricading and flag person operation.

- establishing a continuous relationship with CB Radio users and local base stations for information exchange. The patrol units were specifically equipped with CB radios for this project.

- providing field listening checks to the H.A.R. radio transmissions to check broadcast quality and message accuracy.

- reporting traffic congestion information to the Communications Center for distribution to the radio news reporting media.

- assisting in relocating the concrete barrier wall when displaced by vehicle hits.

In addition, because of the need for a quick heavy duty towing capability, if a truck incident blocked the roadway, an ex-Army M62 wrecker with PO ton lift and 20 ton winching capacity was parked along the Edens Expressway to be used by the assigned patrol. It was supplemented by a Holmes 750 wrecker also operated by the Emergency Traffic Patrol.

During the two year (1979 and 1980 from May 27 - October 31) construction period 8430 motorist assists were made by the Patrol in the construction area.

Traffic Systems Center - Surveillance Activity

The philosophy of freeway surveillance and control implementation in the Chicago area reflects the experience gained since 1961. The surveillance system, featuring the basic loop presence detection, leased phone line interconnect with the central process digital computer, and tone telemetry signal communications, was installed as the initial backbone component. When operational, the surveillance system provides:

- real-time traffic information, which helps operate the freeways;

- incident detection, which aids the emergency patrol service.

The reconstruction project directly impacted the existing surveillance facilities on the southern portion of the Edens Expressway as well as the seven outbound ramp controls in this section. In addition, surveillance expansion and the addition of eight inbound ramp controls was included in the project.

Morever, the entire redesign featured the inclusion of surveillance/control duct and interconnect in the base of the continuous median safety barrier to reduce the number and costs of leased telephone data channels. All the surveillance and control elements were designed as an integral system for the entire Edens Expressway length, but the components were divided into the separate contract plans for each of the six rehabilitation sections.

The need for additional surveillance and control for Edens was determined by traffic engineering analyses, which showed that all but the northernmost section were currently operating worse than Level of Service "D", and were expected to remain operating worse than Level "D" in 1995. Also, operational observations indicated that these sections had peak-period demands which regularly approached or exceeded shorter-term capacities, producing turbulence and congestion which could be expected to worsen with continued north suburban growth.

Besides congestion regularly occurring from capacity-reducing incidents, the Edens Expressway had a major recurring morning rush-period backup caused by the merge with the southeastbound Kennedy Expressway. From the analysis of data collected through the existing surveillance system and operational observations, ramp metering at eight locations southbound was included to alleviate this recurrent congestion problem.

The existing Edens-Kennedy Expressway surveillance instrumentation had provided traffic planning data for analysis to determine the probable traffic impact of daily operations during reconstruction. Traffic surveillance information obtained in the summer of 1978, when the inbound right lane was closed during the shoulder reconstruction stage allowed the comparison of inbound demand with counts outbound, where no closures existed and the full roadway was available to traffic. Also, counts were compared on the Kennedy Expressway at various points to help estimate inbound traffic diversion patterns.

The data studied during the inbound Edens shoulder reconstruction showed that 13,000 - 15,000 inbound vehicles diverted daily, in both peak and off-peak periods, (from 65,000 inbound Average

Daily Traffic), with no apparent diversion outbound. This indicated inbound diversion to other routes, without significant diversion to other modes, perhaps since only one half of a commuting trip was affected. About one half of the inbound diversion was traced to the west leg of the Kennedy Expressway. Although some traffic entered Kennedy ramps west of the Edens junction, most of the diversion using the west leg appeared to be longer trips also using the Tri-State Tollway. The remaining half of the inbound Edens diverted traffic was absorbed onto the other alternate routes available.

The analysis of surveillance data not only showed what inbound patterns could be expected during the reconstruction, but also illustrated that other modes and travel options needed more motorist consideration. Public transportation and ride sharing, in particular, were emphasized as alternatives in the advance project publicity.

The value of the surveillance instrumentation for traffic planning and operations, as well as for real-time incident management and traffic reporting, resulted in the use of temporary detection stations during the 1979 reconstruction work. The initial excavation work for temporary ramps and other activities quickly removed most existing surveillance loops from operational service.

Highway Advisory Radio (H.A.R.)

After Travellers Information (and Highway Advisory Radio) stations were changed from experimental to regularly established status by the Federal Communications Commission in 1977, tentative plans were made for establishing one or more such stations in the Schaumburg District. A need was recognized for a radio advisory service as a means of communicating with motorists during the course of highway construction projects. In particular, it was judged that motorists approaching or using the Edens Expressway during the course of its reconstruction might benefit from a continuous broadcast of information on such matters as alternate routes, lanes out of service, and temporary traffic arrangements.

As soon as radio equipment for the contemplated type of service had been type-accepted by the Federal Communications Commission, transmitting licenses were applied for. They were granted on August 14, 1978. Other than in an extremely low radiated power or an experimental licensing category, these are believed to be the first licensed highway advisory radio stations in the United States. Following completion of the equipment installation, the beginning of continuous transmissions from both stations occurred March 28, 1979.

The H.A.R. System was used to achieve the following objectives:

- Encourage motorist consideration of alternate routes or transportation modes by providing advance information concerning closures of travel lanes or interchanges.
- Afford safer travel by inducing motorists to: observe the posted speed limits, be alert for construction personnel and vehicles, and refrain from using the shoulder for routine travel.
- Help reduce accidents and lessen congestion by attempting to achieve less abrupt lateral lane movements through providing more advance warning of accidents and lane closures.
- Increase compliance with speed limits and minimize other breaches of law, within the construction zone, through motorist education and by encouraging motorists to report violators to a designated telephone number.
- Stimulate motorists to spontaneously divert to alternate routes by broadcasting the existence of severe accidents that produce significant congestion. Expected incidents of this type would not exceed 2 to 3 daily.
- Minimize negative public reaction to the construction project by explaining in general terms what is closed, what is being done, and why it is necessary.

By dialing 1610 on their AM radio dial, motorists were given 24 hour, up-to-date information on the status of lane closures, ramp closures, temporary traffic arrangements, and information on incidents affecting Edens Expressway traffic flow. The low powered transmitters were located at approaches to the Edens Expressway and had a broadcast range of two to four miles depending on weather conditions.

Special signs were erected on the Northbound Kennedy Expressway near its junction with the Edens Expressway and on U.S. Route 41 at the Edens approach-to inform motorists of both the radio frequency and the point on the expressway system where transmissions could be received. Since public radio broadcasting represented a new experience to our highway agency, we were concerned that the taped messages (varying from 45 to 90 seconds in length) would be understood and useful to the driver. Over 300 taped messages were prepared and played during the two year (1979 and 1980) construction periods.

Though we have received positive comments from the motoring public about the provision of this HAR System information, it was difficult to determine our "listenship" and whether our messages had been effective. A "mail back" motorist survey conducted in August 1979 revealed 36% (of 160 questioned) tuned to 1610 AM for messages occasionally.

In 1980, a flashing beacon and associated sign was added to the HAR System signing to alert motorists to the radio information availability in addition to advising them when to tune in for special bulletins regarding construction area congestion.

Speed Limit

A speed limit was established at 35 MPH during the 1979 and 1980 construction work. Although the violation rate increased during some non-peak periods and the police ability to enforce it was limited, it was felt warranted and effective. Comparing speed studies taken before and after construction, the prevailing speed of traffic was reduced 10 MPH. This reduction in speed reduced accident severity and increased working area safety.

Though we had citizen requests to raise the 35 MPH speed limit, we justified its retention by showing that the following special construction conditions existed:

- Heavy traffic volumes using substandard width travel lanes,

- Proximity of barrier median wall to the traveled way narrowed vehicle clearances.

- The temporary ramp connection geometrics (designed for 25 MPH) were based on a 35 MPH mainline travel speed for safe acceleration-deceleration maneuvers.

- Proximity of heavy construction operations tended to distract the motorist.

- Frequent phase changes with respect to the closing of interchanges required attention to sign changes alerting drivers to ramp closures.

- Flag person control on ramp crossings resulted in frequent traffic stoppages.

Accident Experience

Because of the lane width and horizontal clearance reductions resulting when a normally 3 lane directional roadway and right shoulder is converted to a 2 way operation separated by a concrete barrier, the accident experience was closely monitored. Of additional concern was the impact of the reduced acceleration-deceleration lane lengths because of the right shoulder use as a moving lane.

During the period from May 20, 1979 to October 31, 1979 (when all traffic was using the Southbound roadway) we experienced a total of 543 accidents (62% Northbound, 38% Southbound). This compared numerically with the 578 accidents we experienced in 1977 and 730 accidents in 1978 during the same time period. However, since traffic volumes were less during the 1979 construction, the actual accident rate (expressed in accidents per vehicle miles driven) was slightly higher. Other significant comparisons revealed the traffic'control impact. Trucks were involved in 38% of all the accidents in 1979 while they were involved in only 13% of the accidents in 1977 and 1978. During 1979, 36% of the vehicles 'involved in accidents were driven by motorists from outside of the 6 county Chicago Metropolitan Area. This is higher than the 28% average for the previous years. The concrete median barrier was involved in 10% of all accidents and prevented as many potential head on collisions.

Accident occurrence during the 1980 construction period tended to reflect the 1979 experience.

Reconstruction Traffic Impact

Once the Edens Expressway work began, with traffic confined to two lanes in each direction on one roadway, the traffic impacts were monitored continuously by the temporary surveillance instrumentation. Real-time data were used for incident detection and traffic reporting purposes. Counts and congestion'records were retained daily for analysis of the traffic pattern changes.

In general, the Edens handled over 70% of its normal amount of weekday traffic during the reconstruction, although less than two-thirds of the normal capacity was available for use. The percentage diversion in peak periods was up to 5% higher than the 24-hour average. There was more peak-period diversion at the start of the project, and less congestion on Edens, until traffic balancing in the first weeks established the new patterns. Of the daily trips diverted, some 40-50% were again traced to use of the Kennedy Expressway west leg.

Slightly more inbound morning peak-period congestion was experienced during reconstruction, while the outbound afternoon peak-period congestion nearly doubled. Perhaps one reason there was more outbound diversion than inbound relates to the variance in peak-period congestion. It should be noted, moreover, that the outbound normal peak-period congestion for Edens included the impact of metering at seven entrance ramps, whereas the reconstruction condition did not.

Other changes noticed in traffic patterns included less peak-period congestion on the Kennedy Expressway southeast of the Edens Expressway junction, and additional peak-period congestion on the Kennedy Expressway west leg due to the diverted traffic impacts. Although no data were analyzed, observations of considerably less truck traffic were reported for Edens Expressway, combined with noticeable increases on the Tri-State Tollway (a parallel route approximately 6 miles west of Edens Expressway).

Since more than half of the diverted traffic was absorbed by routes, modes, or alternatives other than the Kennedy west leg without causing any major traffic problems, it is speculated that combinations of the following were factors affecting traffic demands:

- Many arterial routes handles some diverted traffic without the excess overly disrupting normal conditions.

- Some through traffic, such as long-haul truckers and interstate drivers, avoided Edens completely by using I-294, I-290, I-90, or combinations thereof.

- Some longer-trip drivers shared rides and/or diverted to public transportation, taking advantage of commuter rail feeder buses and extra trains provided by Regional Transit Authority.

- Many drivers cancelled, substituted, combined, or otherwise avoided Edens Expressway trips of a discretionary nature, such as for shopping, recreation, or non-urgent work purposes. The current energy crisis, which began in April 1979, served to further encourage motorists to conserve vehicle trips, due to the cost and-availability of fuel.

Finally, the Edens reconstruction project illustrates that proper traffic planning will help establish public awareness of the project and the expected impacts. The fact that the predicted traffic chaos never resulted is demonstration that the planning and implementation of the overall traffic program was most effective.

MINNEAPOLIS - CONSTRUCTION OF I-394

STRGAR-ROSCOE-FAUSCH, INC.

CONSULTING ENGINEERS

TRANSPORTATION ■ CIVIL • STRUCTURAL ENGINEERS ▫ LAND SURVEYORS

I-394 INTERIM HOV LANE:

A CASE STUDY

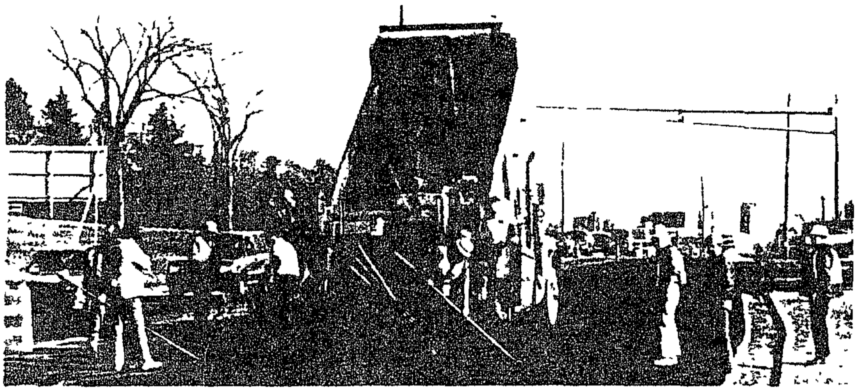
A SUMMARY OF WHAT WE HAVE LEARNED DURING THE FIRST SIX MONTHS

REVISED JUNE 26, 1986

PREPARED FOR
MINNESOTA DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

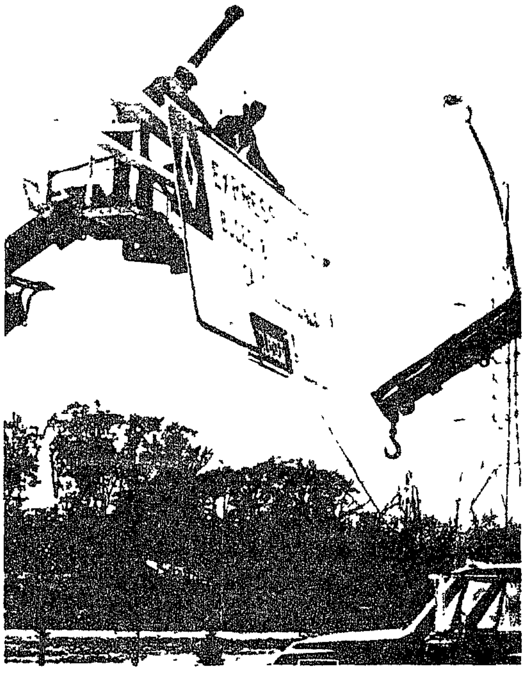
630 Twelve Oaks Center, 15500 Wayzata Blvd., Wayzata MN 55391 (612) 475-0010

Reversible 'sane lane' paves way for completic



T. Shatek (2)

A fresh layer of bituminous is leveled off at the HOV lone entrance just east of Highway 100 on US 12



Interstate 394, the freeway which will connect Minneapolis with its western suburbs, entered its first state of completion Nov. 19 with opening of the reversible "sane lane" along the route of existing us 12.

The special high occupancy vehicle (HOV) lane carries only buses, vanpools and carpools having at least two people. It IS the first such lane to be built in Minnesota.

The express lane concept was chosen to move the maximum number of commuters with the fewest number of vehicles.

The lane, which will eventually be replaced by two HOV lanes when I-394 is completed, will help reduce traffic congestion in the 11-mile US 12/I-394 corridor from Minnetonka to Minneapolis while the freeway is under construction. Users can expect to cut about five minutes driving time and the stress of driving on the extremely busy highway. Completion is expected by late 1990.

The HOV lane built in the median of US 12 carries eastbound rush hour traffic from 6 a.m. until 9 a.m. and westbound evening rush hour traffic from 3 p.m. until 7 p.m. The Mmnesota State Patrol monitors the lane to ensure compliance. The lane is closed the remainder of the day for safety and to allow its use by contractors building I-394.

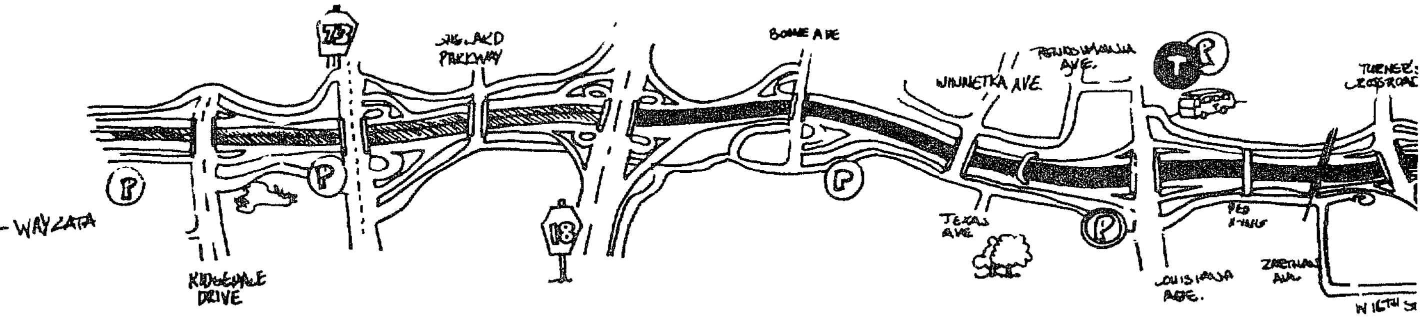
The lane runs from Essex Road to Ridgedale Drive and from Wmnetka Avenue to Wirth Parkway.

Cooperation from commuters to ride the bus or Carpool IS crucial for both the temporary "sane lane" and the final design of I-394 with its two HOV lanes to reduce congestion and to move the thousands of commuters who use the route daily.

Poolers will be able to use a new, 250-space parking lot at 10th Street and Glenwood Avenue and four other lots downtown without cost.

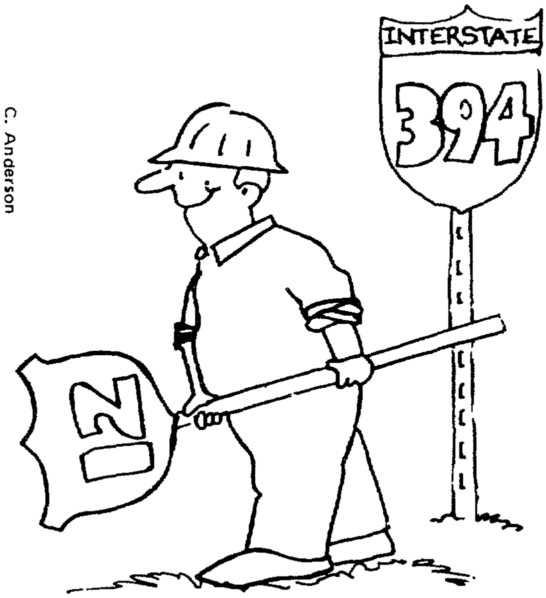
"The entire concept of I-394 is unique because it's designed to move people, not vehicles," said Dick Borson, Golden Valley, I-394 project manager.

When completed, I-394 will offer commuters a number of options to get to work. In addition to express lanes for buses and pools, there will be transit transfer stations,



on of I-394

C. Anderson



(Left) Workers install an entrance sign for the HOV "sane lane" on US 12. (Above) Gary Thompson (left), project engineer, and Fred Moritz, construction inspector, check out the newly paved HOV lane.

park-and-ride lots and three parking garages built as part of the I-394 project in downtown Minneapolis for carpools and vanpools.

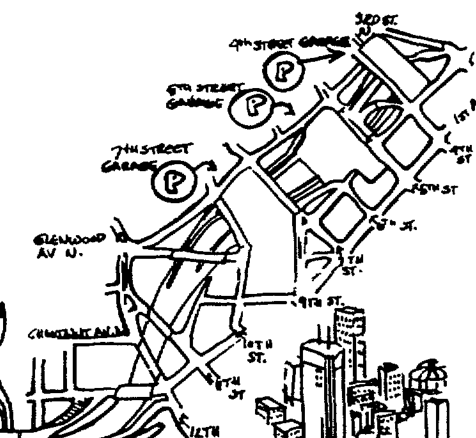
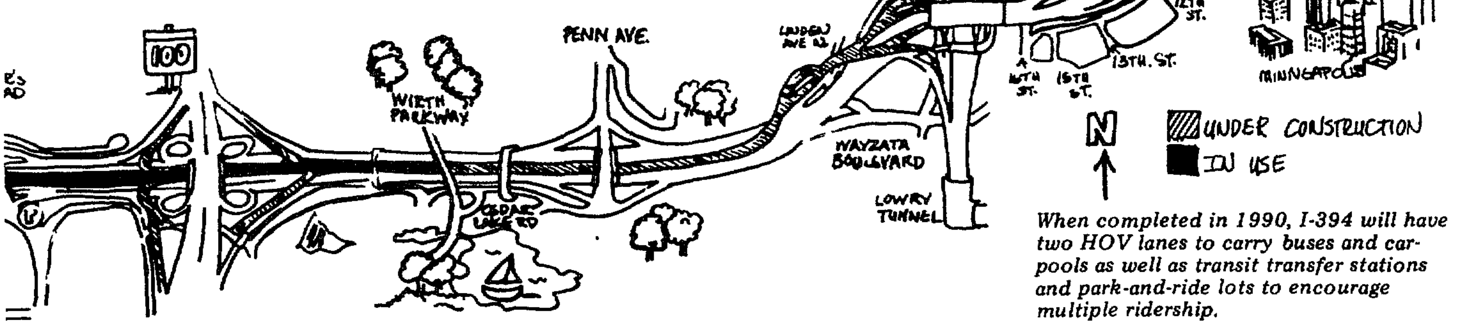
Transit stations will enable bus riders to transfer from one bus to another using the new freeway.

The parking garages, to be situated at Fourth, Fifth and Seventh Streets along the Third Avenue Distributor, will provide preferential parking for carpools and vanpools.

Mn/DOT is aggressively promoting the "sane lane" concept for a full year because increasing the number of commuters who use the bus or join a pool is essential to its success and that of I-394, said Don Stevens, public affairs coordinator at Golden Valley. A large-scale campaign which includes public service announcements, radio, newspaper and television ads and brochures, is under way to persuade commuters who use US 12 to change their habits.

In addition, a telephone hotline (HELP-394) has been set up to answer questions about the "sane lane" and the future of I-394.

Craig Wilkins

When completed in 1990, I-394 will have two HOV lanes to carry buses and carpools as well as transit transfer stations and park-and-ride lots to encourage multiple ridership.

A. INTRODUCTION

By all measures--operation, use, public acceptance--the I-394 Interim HOV Lane has been an overwhelming success. The following Table summarizes use of the HOV lane in May, 1986. The key questions being addressed by the Case Study are:

1. What factors needed careful attention or finetuning to assure that the HOV lane worked as intended?

2. What level of use has the HOV lane had and has there been growth in use?

3. How did the HOV lane affect carpooling on Highway 12 and throughout the corridor? What effect, if any, did the 2+ Carpool definition have?

4. What effect, if any, did the HOV lane have on bus services and bus ridership?

5. How well are carp001 parking and park/ride facilities used?

6. What effect, if any, did the HOV lane have on travel times?

7. What effect did marketing have on the HOV lane and how well was it accepted by the public?

SUMMARY OF KEY DATA

I-394 Interim HOV Lane West of Turner's Crossroads
May, 1986

	A.M. PEAK HOUR	A.M. PEAK PERIOD	P.M. PEAK HOUR	P.M. PEAK PERIOD-
AVERAGE NUMBER OF VEHICLES				
HOV Lane	495	860	390	1,060
Mixed Traffic Lanes	1,610	4,570	2,000	7,730
NUMBER OF BUSES (April 16)				
HOV Lane	13	22	15	26
Mixed Traffic Lanes	5	12	4	17
AUTO PERSON TRIPS				
HOV Lane	960	1,700	900	2,520
Mixed Traffic Lanes	1,590	4,480	2,240	8,470
BUS PERSON TRIPS				
HOV Lane	430	730	500	860
Mixed Traffic Lanes	170	400	130	560
TOTAL PEOPLE SERVED				
HOV Lane	1,400	2,440	1,390	3,380
Mixed Traffic Lanes	1,810	5,150	2,400	9,440
-(Per Lane)	905	2,575	1,200	4,720

COMPLIANCE
95-97% of vehicles in HOV lane have two or more people.

TRAVEL TIME SAVINGS OF HOV LANE COMPARED TO MIXED TRAFFIC
Average measured time in peak hour 5 Minutes

Average perceived time 10 Minutes
(from March, 1986 survey)

INTERIM PARKING LOT
An additional lot of 320 spaces (total of 571) added for registered Carpools. 320 registered Carpools as of May 31.

B OPERATION AND DESIGN OF THE HOV LANE

1. Overall, the HOV lane has worked remarkably well and as expected. Experience during design, construction and the first six months of operation have indicated some areas which should be given careful consideration in the design of similar facilities.

2. The merges to and from the HOV lane are left merges which are always an operational problem. Merging into and out of the HOV lane can be difficult under heavy traffic congestion. Long merge lanes should be provided where possible.

3. Illegal turning at the intersections was initially a problem. Additional signing was required for effective enforcement. This problem appears to have declined significantly since signing was improved and people have become aware of the regulations. However, the large amount of signing at the intersections may be confusing to drivers. Intersection signing should be evaluated to determine if it can be simplified.

4. It was initially anticipated that weaving in and out of the mixed traffic lane at the diamond lane section might be a problem. This has not occurred. This may be because the section is quite short and visibly connects to two separated sections. Initially, this section also was not used a great deal for merging to and from the HOV lane. Recent vehicle counts indicate that more people are making this move as people are becoming aware of the option. The diamond symbol in this section needs to be repainted frequently.

5. Signal coordination is critical to maintaining travel time savings in the HOV lane. Signal phasing needs to be checked periodically and has been adjusted several times since the lane was opened. Some compromises **are** usually necessary. For example, heavy left turn volumes may require a longer left turn phase in the peak direction which may cause some delay for the HOV lane.

6. A fairly large number of entrance gates have had to be replaced. Several gates have been destroyed by wind and a number of gates have been hit at night, presumably by drunk drivers using the wrong lane or turning short at an intersection. Consideration should be given to painting the gates white for increased nightime visibility.

7. Snow removal has not been a problem, even in the narrow section over Highway 100. Standard plowing has been adequate to handle snow removal. Since T.H. 12 has priority plowing status, special status was not necessary. The Mn/DOT plowing staff took personal pride in seeing that the lane was always completely cleared of snow before it was opened so the lane was consistently well plowed.

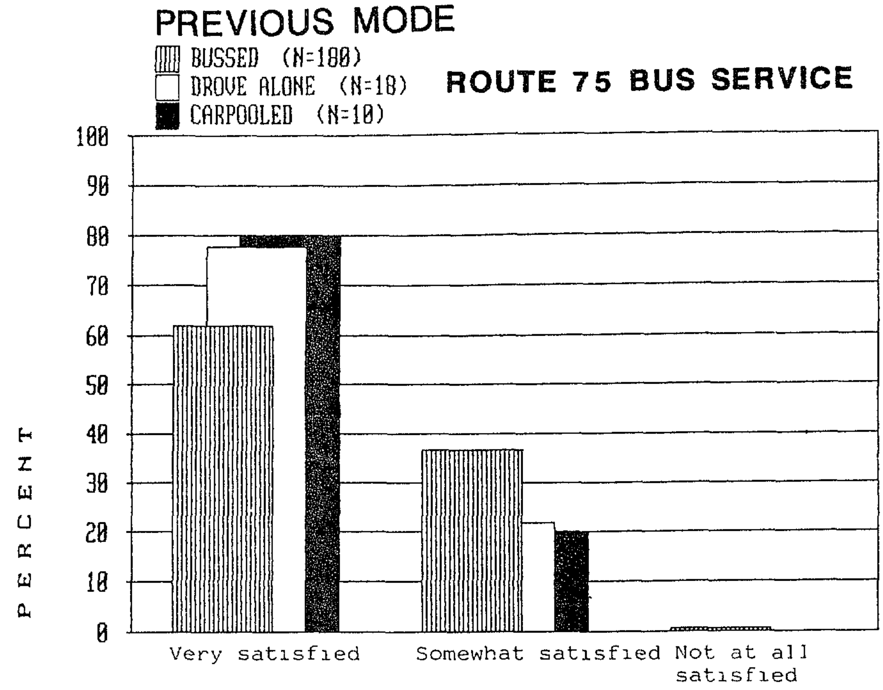
8. The hours of the HOV lane have been extended an hour during each peak period. Operating hours are now 6-10 a.m. and 2-7 p.m. Mn/DOT has established warrants for extending the hours and, if warranted in the future, Mn/DOT is prepared to extend hours further. Current traffic volumes indicate that additional eastbound a.m. hours are not warranted but opening the lane westbound at 1 p.m. or even noon might be warranted.

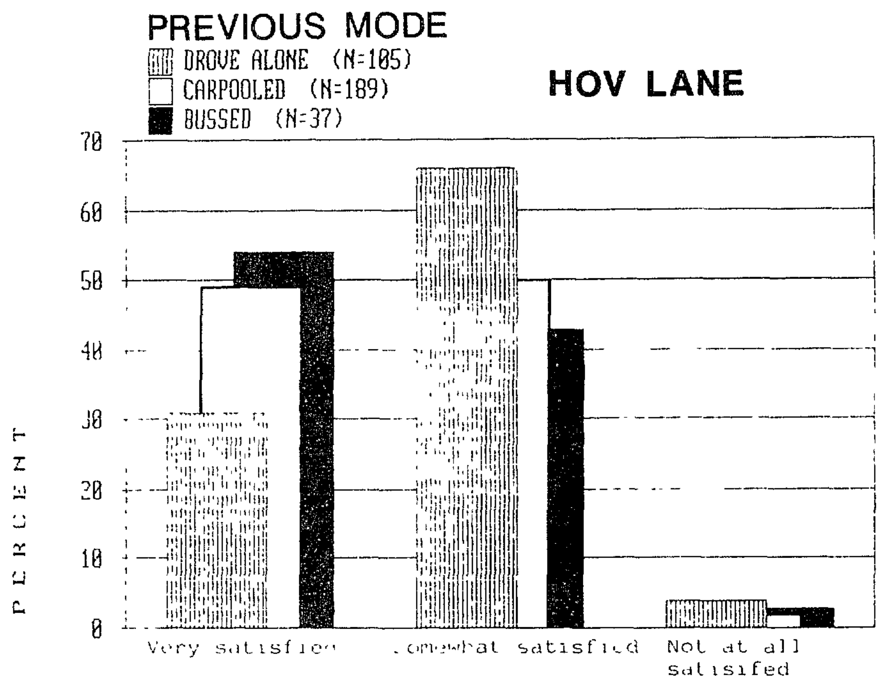
9. Occupancy violation has not been a significant problem. We believe that initial heavy enforcement was a key factor. Violation rates have stayed consistently between 3 and 5 percent even though enforcement activities have been reduced.

10. An active rather than a passive reminder system is needed to assure that the lane is always opened at its scheduled time.

11. The lane appears to be operating very safely. Accident data is spotty to date but conversations with enforcement agencies indicate that the only accidents which have occurred in the lane were minor accidents related to adverse winter weather conditions or drunk drivers hitting the entrance gates at night.

12. People surveyed in March, 1986 who use the lane express satisfication with its operation (see Figure 1). Suggestions for improving the HOV lane which were given by the people surveyed are shown in Figure 2.





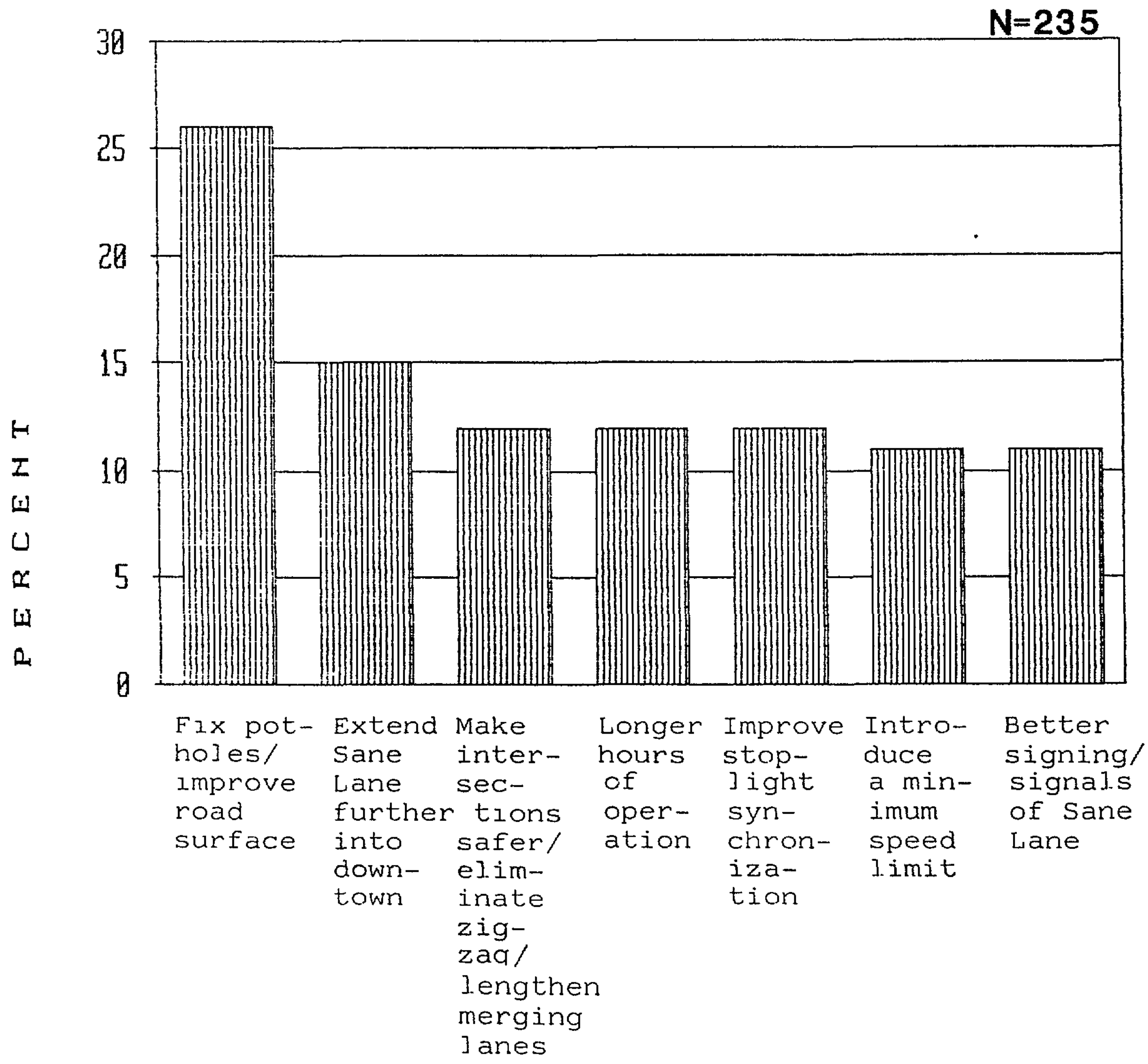
SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC.

SATISFACTION WITH ROUTE 75 BUS SERVICE AND HOV LANE

I-394 HOV LANE

FIGURE 1



SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC.

SUGGESTIONS TO IMPROVE THE HOV LANE

I-394 HOV LANE

FIGURE 2

C. USE OF THE HOV LANE

1. The highest use of the HOV lane is during .the a.m. peak hour (7-8 a.m.). Use is steadily increasing during both peak hours and peak periods (see Figures 3 and 4). There was an initial surge in use when the lane first opened, followed by a drop and then continued growth. We believe that the initial surge was the result of experimentation with the HOV lane by both new carpoolers and carpoolers diverting from other routes.

2. A.M. peak hour Carpool volumes (including both the HOV lane and the mixed traffic lane) on T.H. 12 west of Turner's Crossroad have increased 116.7 percent since 1984 in the morning and 50.0 percent in the p.m. peak hour. Total traffic volumes on T.H. 12 increased 6.9 percent in the a.m. peak hour and 3.8 percent in the p.m. peak hour during the same time period.

3. A.M. peak hour volumes in the HOV lane have increased 22 percent since the lane opened in November. Average a.m. peak hour volumes in May were 495 vehicles, two percent above the annual peak hour goal. The maximum number of vehicles counted to date in one hour was 570, counted in April.

4. During the a.m. peak hour, the HOV lane carries 1400 people in 460 vehicles compared to only 900 people in 785 vehicles in each of the eastbound mixed traffic lanes (see Figure 5).

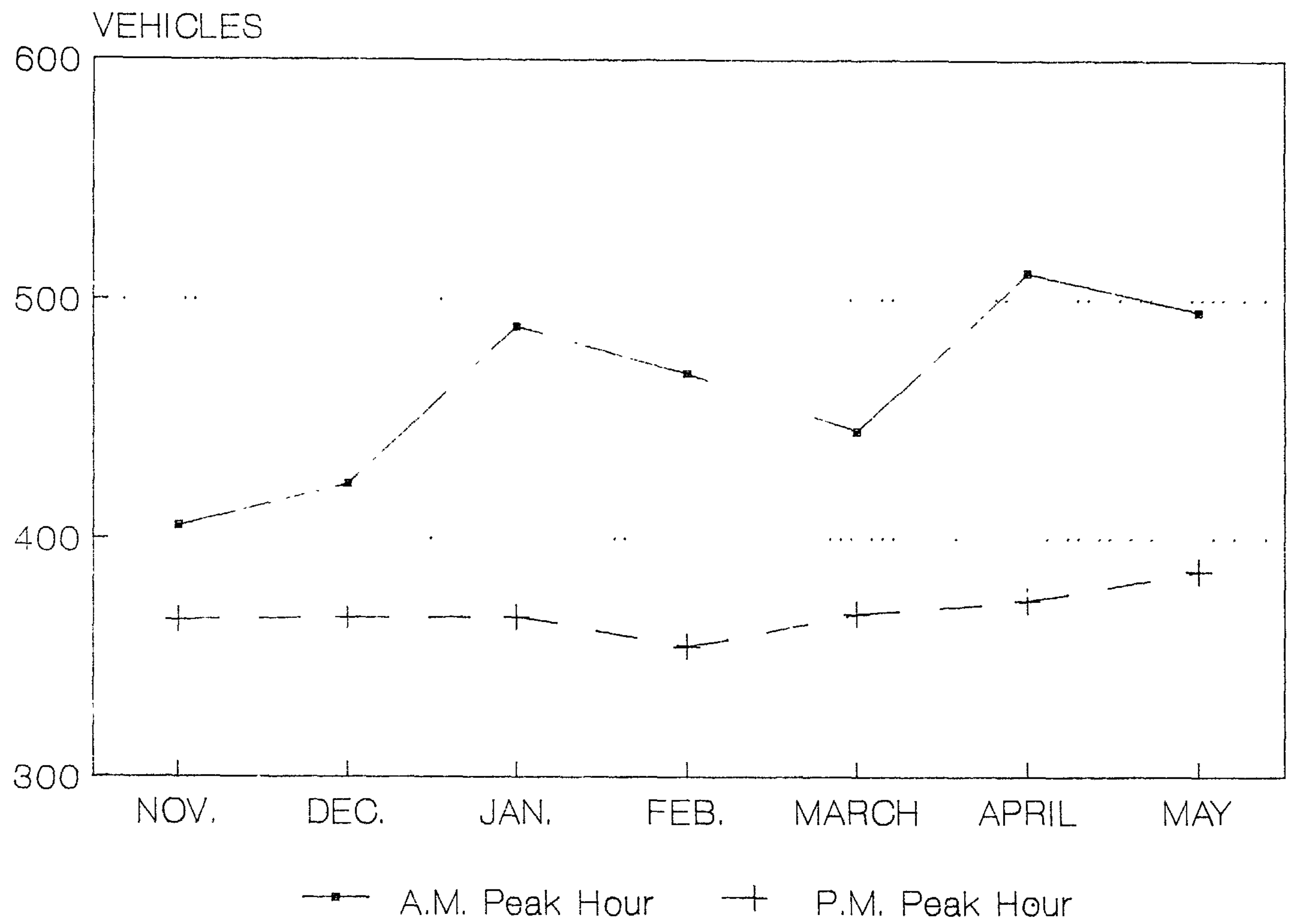
5. About 85% of the Carpools on T.H. 12 west of Turner's Crossroad use the HOV lane in the morning and 79% use the lane in the afternoon. This is about the maximum that would be expected to be able to use the lane based on traffic origins and destinations and the limited HOV lane entrances and exits.

6. About one-third of people carpooling in the HOV lane say that they began carpooling after the lane opened in November (see Figure 6).

7. About one third of people who Carpool in HOV lane say that they use the lane less than five days a week (see Figure 7).

8. There has been diversion of Carpools from T.H. 55 to the HOV lane, particularly during the a.m. peak hour. The share of total growth which is diversion has not yet been determined.

9. Use on the Plymouth Road segment is significantly lower than use on the Winnetka to Wirth segments. However, it is now capturing a much larger share of carpoolers than when it was initially opened. We believe that the lower use is this segment is due to four factors: (1) the number of vehicles and Carpools is lower at this point'on T.H. 12, (2) this segment of the HOV lane is very short, (3) drivers sometimes lose time in the HOV lane in this segment due to left turn signal phasing, and (4) travel patterns and trip purposes are very diverse with a large share of shopping trips mixed with commuter trips. We anticipate that use may increase in this segment during construction and when it is directly connected to other segments,

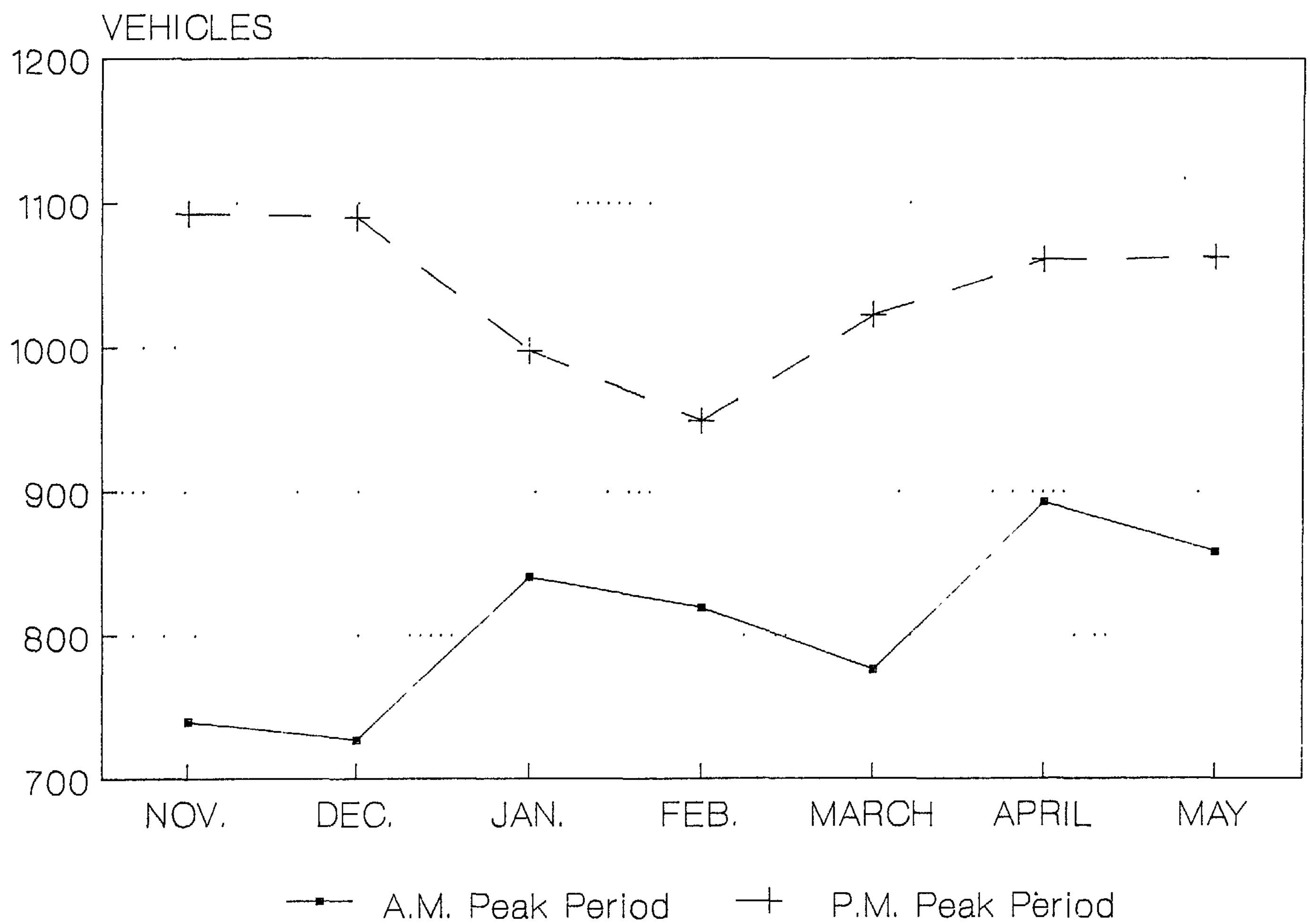


STRGAR-ROSCOE-FAUSCH, INC

MONTHLY AVERAGE OF HOV LANE VOLUME
A.M. & P.M. PEAK HOURS

I-394 CASE STUDY

FIGURE 3

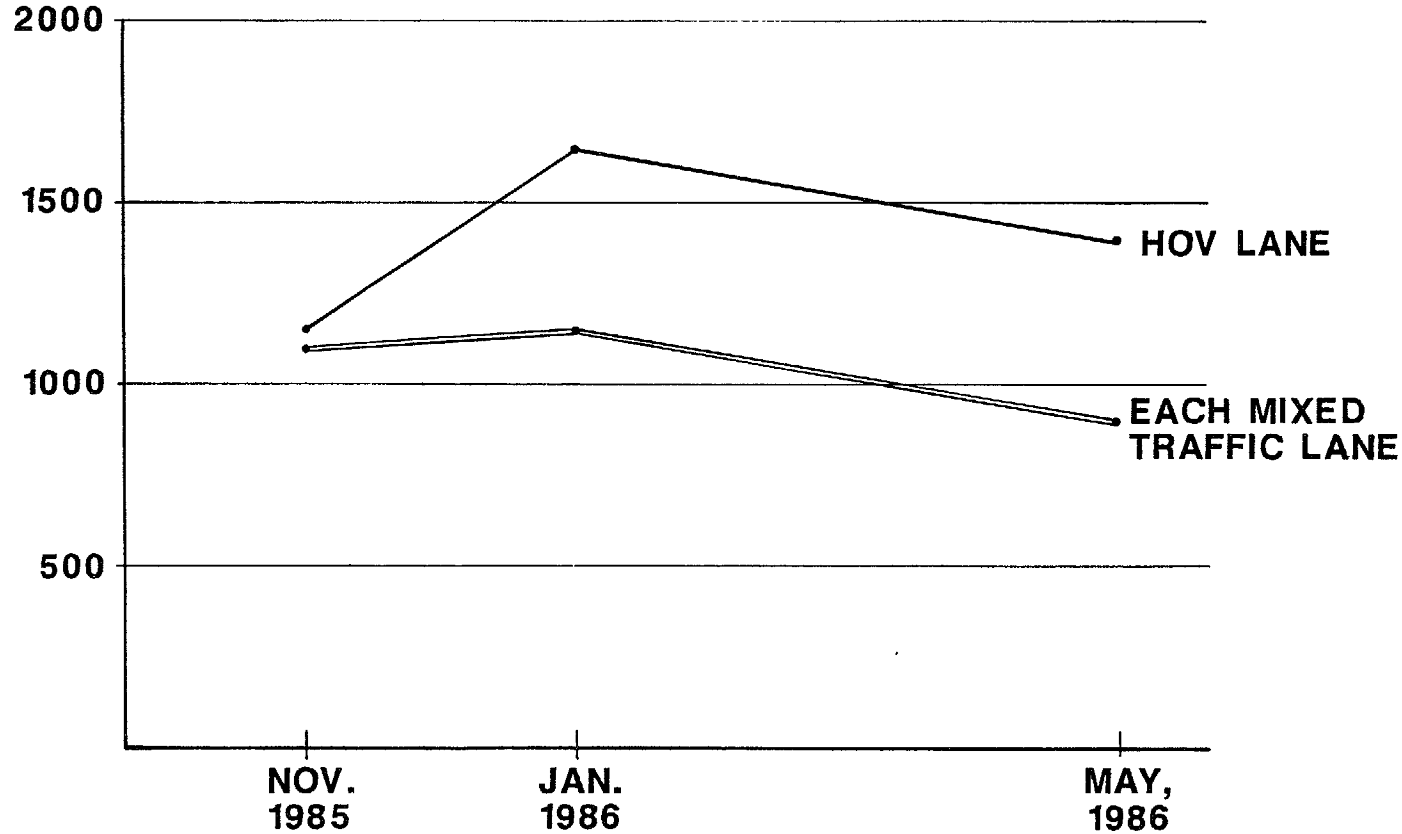


STRGAR-ROSCOE-FAUSCH, INC.

MONTHLY AVERAGE OF HOV LANE VOLUME
A.M. & P.M. PEAK PERIODS

I-394 CASE STUDY

FIGURE 4

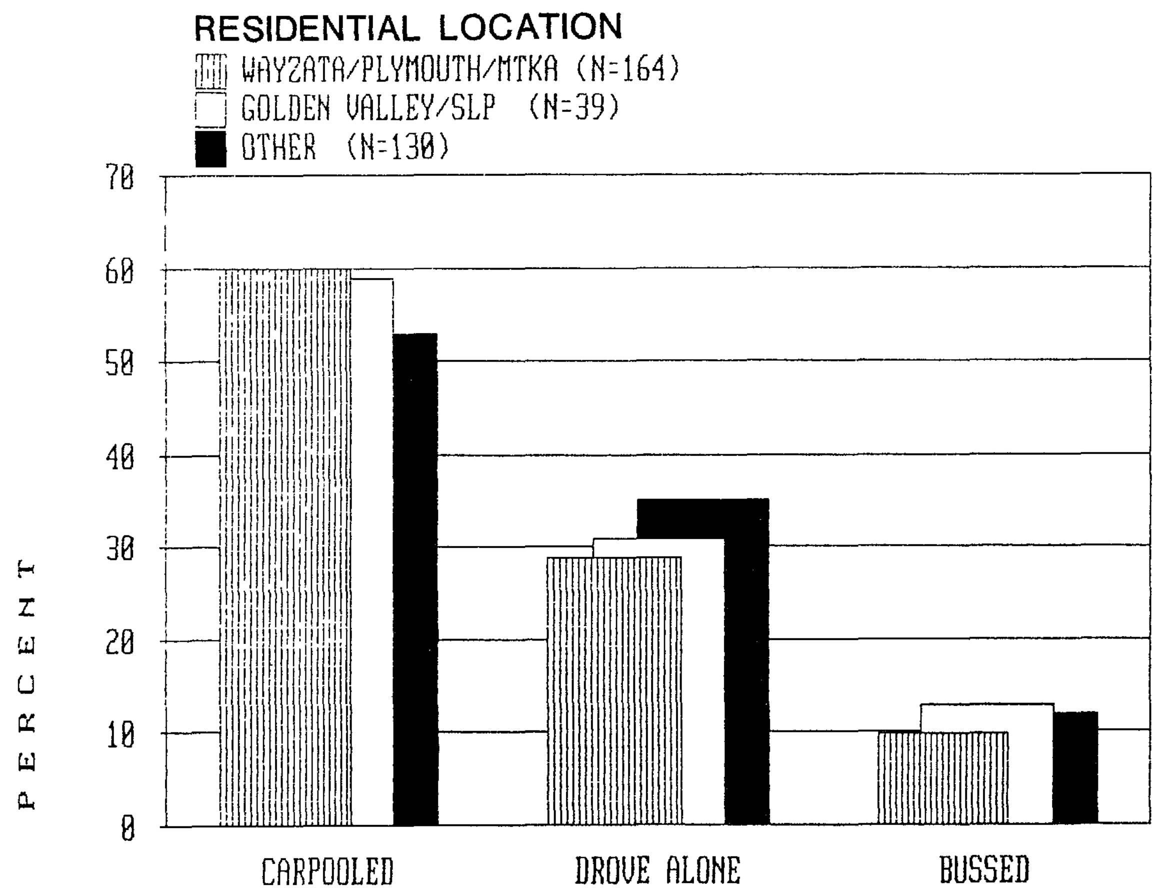


STRGAR-ROSCOE-FAUSCH INC

PEOPLE CARRIED PER LANE
A.M. PEAK HOUR

I-394 CASE STUDY

FIGURE 5



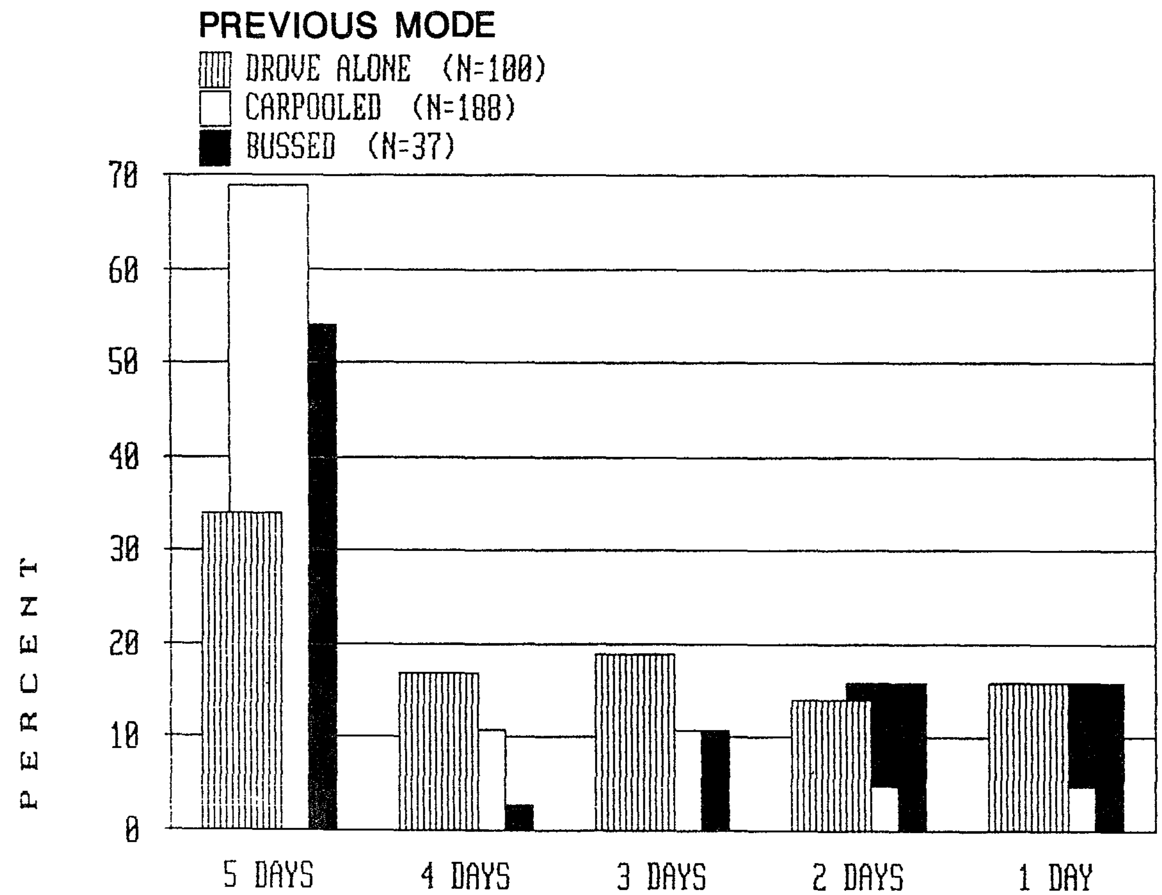
SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC.

MODE OF TRAVEL BEFORE THE HOV LANE OPENED

I-394 CASE STUDY

FIGURE 6



SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC

NUMBER OF DAYS CARPOOL IN A TYPICAL WEEK
(BY PREVIOUS COMMUTING METHOD)

I-394 CASE STUDY

FIGURE 7

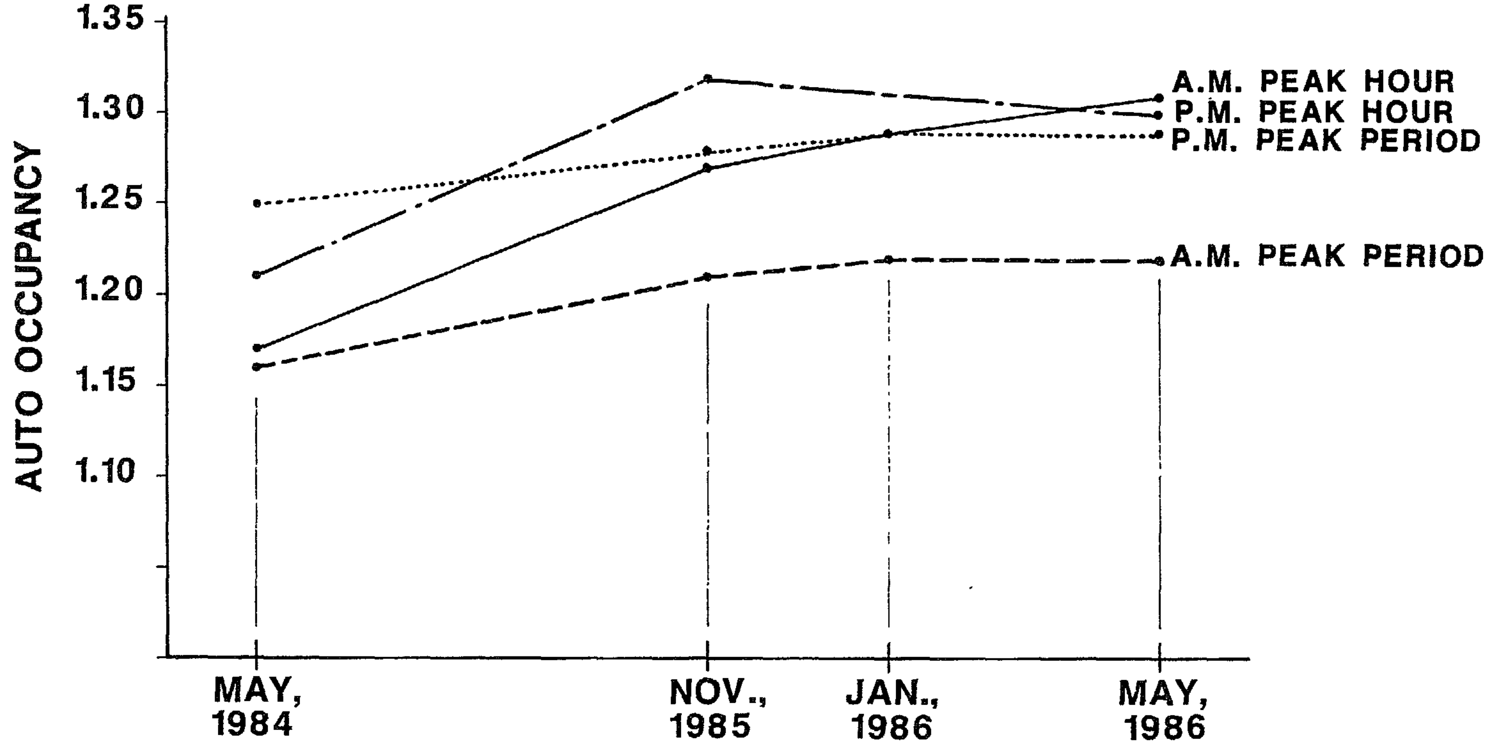
D. OCCUPANCY RATES

1. Auto occupancy rates have increased dramatically since 1984. The a.m. peak hour occupancy rate has increased from 1.17 to 1.31 occupants per automobile and appears to be continuing to climb (see Figure 8) The p.m. peak hour occupancy rate has increased from 1.21 to 1.30.

2. During the same time period, auto occupancy rates have declined throughout the metropolitan area, both in the metro centers and in the suburbs. Preliminary discussions with the Traffic Management Center have indicated that metro center auto occupancy rates dropped from 1.24 to 1.21 between 1984 and 1986 and suburban rates dropped at about the same rate from a 1984 auto occupancy rate of 1.17. Further comparisons will be made when the TMC 1986 auto occupancy analysis is available.

3. The Carpool occupancy rate declined substantially when the HOV lane was first opened (see Figure 9). This was predicted due to the 2+ definition of Carpools. However, the carpool occupancy rate has been increasing since the lane opened and has exceeded its previous level in the afternoon and has almost reached its previous level in the morning. One possible explanation is that people may be forming 3 person pools to assure that they have at least two people each day so they can use the HOV lane.

4. 84 percent of Carpools have two people, 11 percent have three, and 5 percent have four or more (see Figure 10). This is approximately the same distribution of Carpools as that measured in 1984. We believe the 2+ definition, as well as the attractiveness of the HOV lane itself, has been a significant factor in the growth in carpooling.

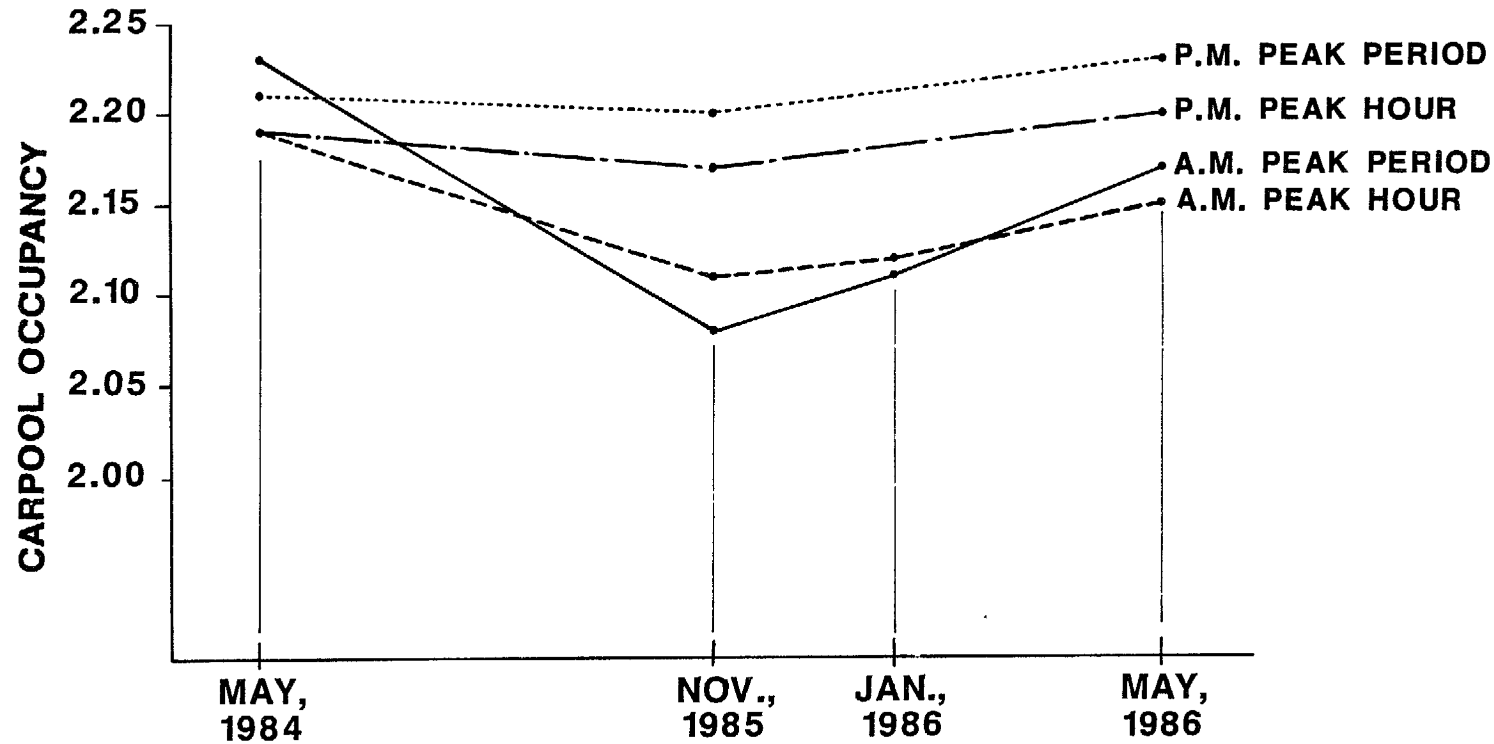


STRGAR-ROSCOE-FAUSCH, INC.

CHANGE IN AUTO OCCUPANCY RATE

I-394 CASE STUDY

FIGURE 8

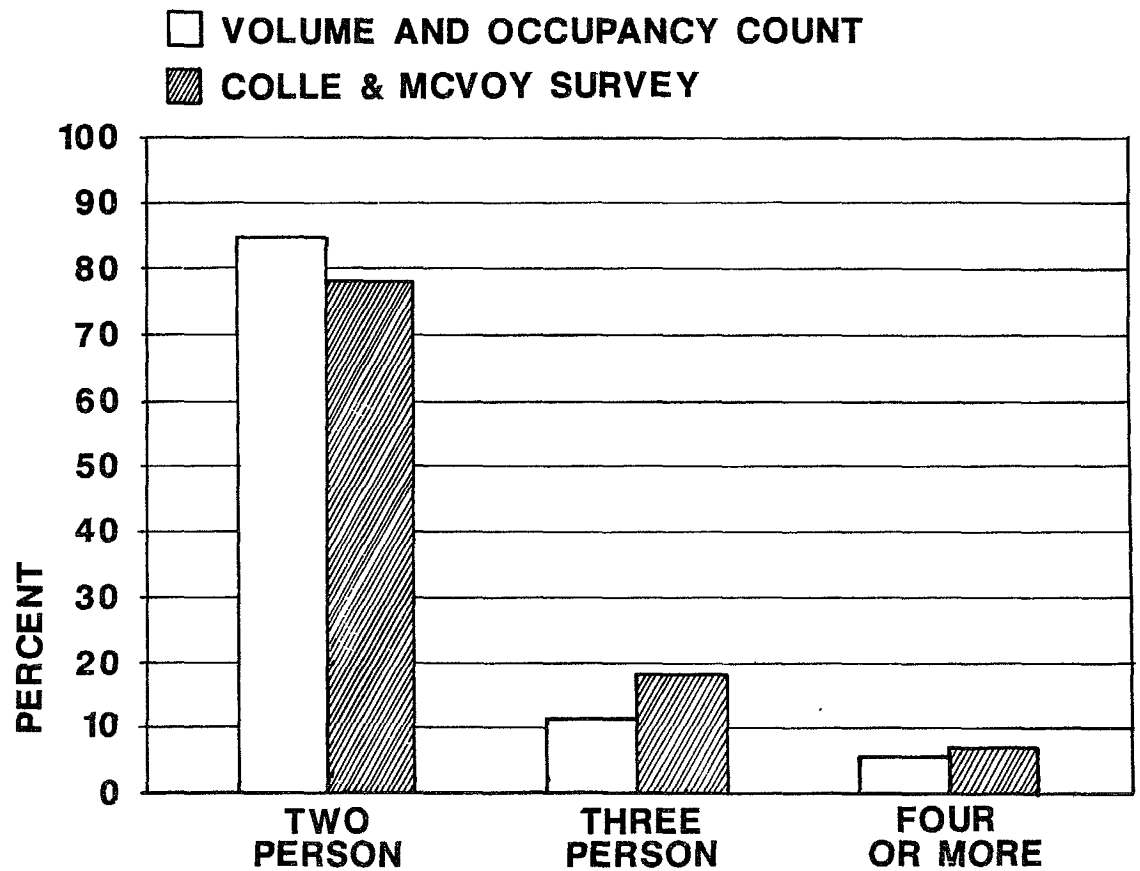


STRGAR-ROSCOE-FAUSCH, INC

CHANGE IN CARPOOL OCCUPANCY

I-394 CASE STUDY

FIGURE 9



STRGAR-ROSCOE-FAUSCH, INC.

NUMBER OF PEOPLE PER CARPOOL

I-394 CASE STUDY

FIGURE 10

E. BUS SERVICE AND BUS RIDERSHIP

1. MTC bus service was reorganized in the corridor to provide better express bus service which could make use of the interim HOV lane. MLL rerouted its downtown express buses to use the HOV lane rather than T.H. 55. The primary effect of these changes was to increase peak hour buses on Highway 12.

2. Periodic changes to bus schedules and routing have been needed and will be needed in the future to compensate for traffic congestion and construction delays. This is expected to be a potentially difficult problem during construction.

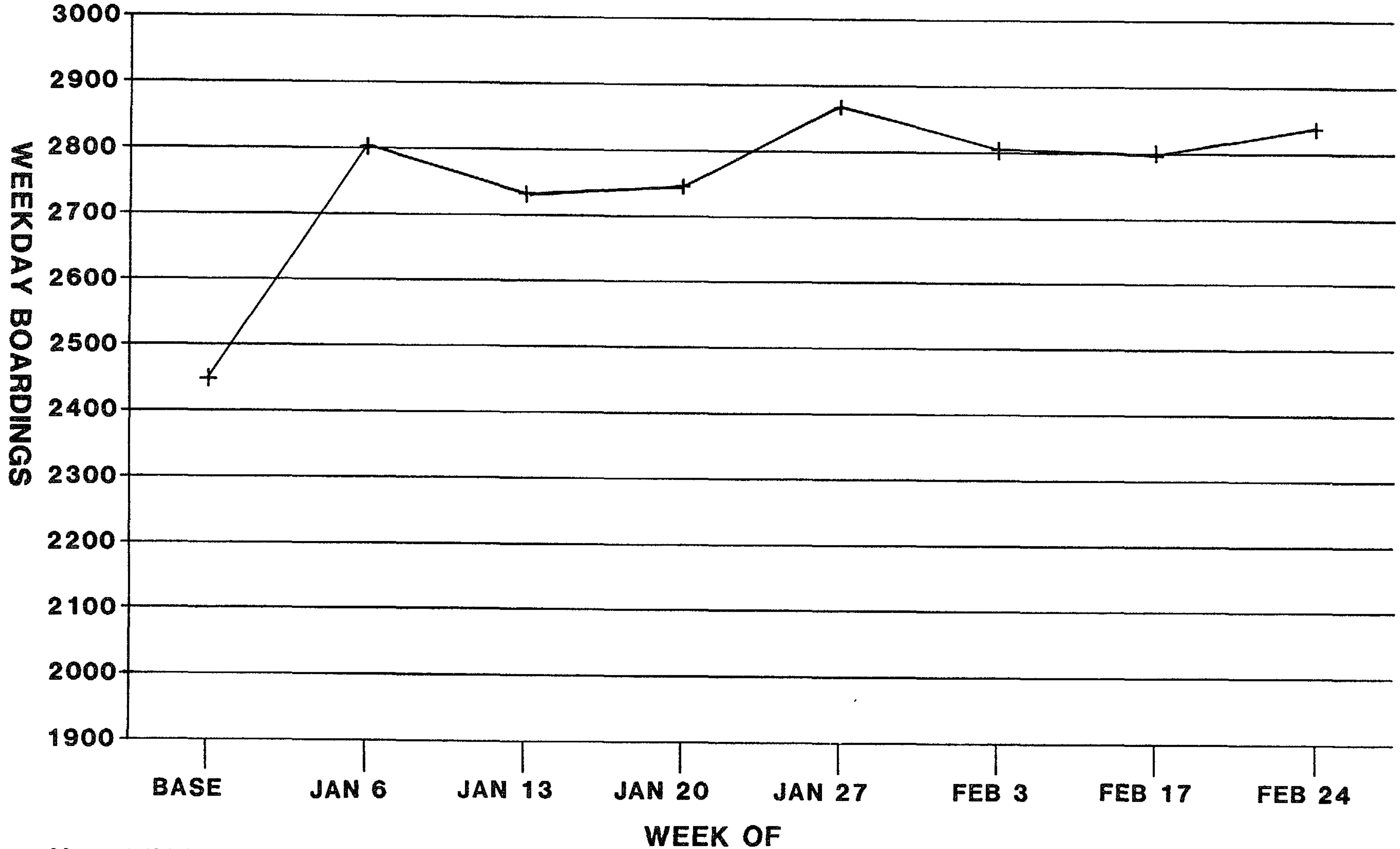
3. The number of buses has increased by 7 buses in the morning peak hour (9 in the peak period) and 4 buses in the p.m. peak hour (one less in the p.m. peak period).

4. Approximately two-thirds of buses operating on T.H. 12 use the HOV lane--the remainder provide local service along the corridor.

5. The average number of bus riders per bus is 35 with the MTC route 51 local service having fewer passengers than the MTC and MLL express service or school buses.

6. The HOV lane carries about 650 bus passengers during the a.m. peak hour and about 670 during the p.m. peak hour.

7. Bus ridership has been increasing gradually on the MTC Route 75 express buses since it was introduced in December (see Figure 11).



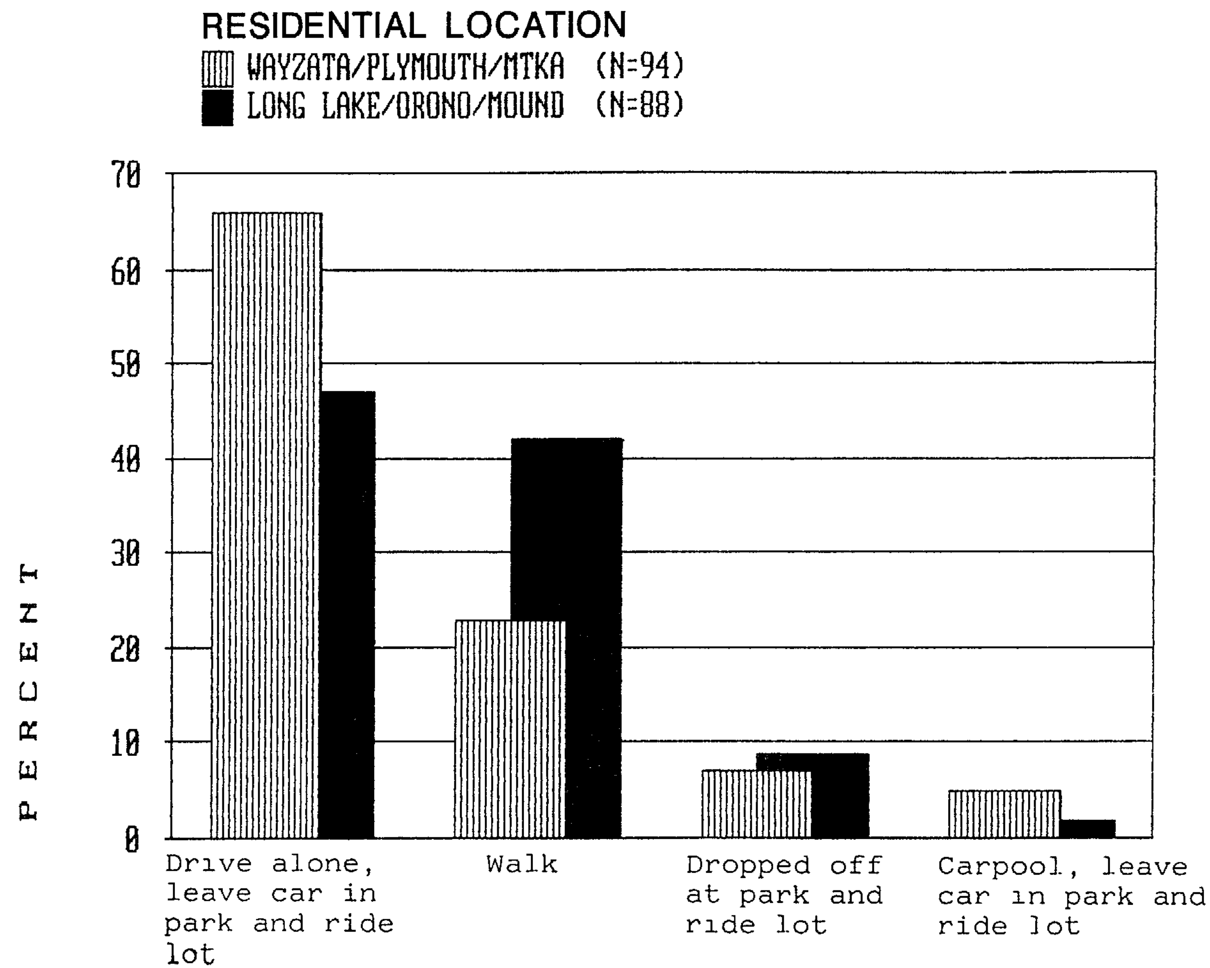
SOURCE: MTC (TO BE UPDATED)

STRGAR-ROSCOE-FAUSCH, INC

ROUTES 51-75-40C, HWY. 12, WEEKDAY MTC PASSENGERS (UNLINKED TRIPS)

I-394 CASE STUDY

FIGURE 11



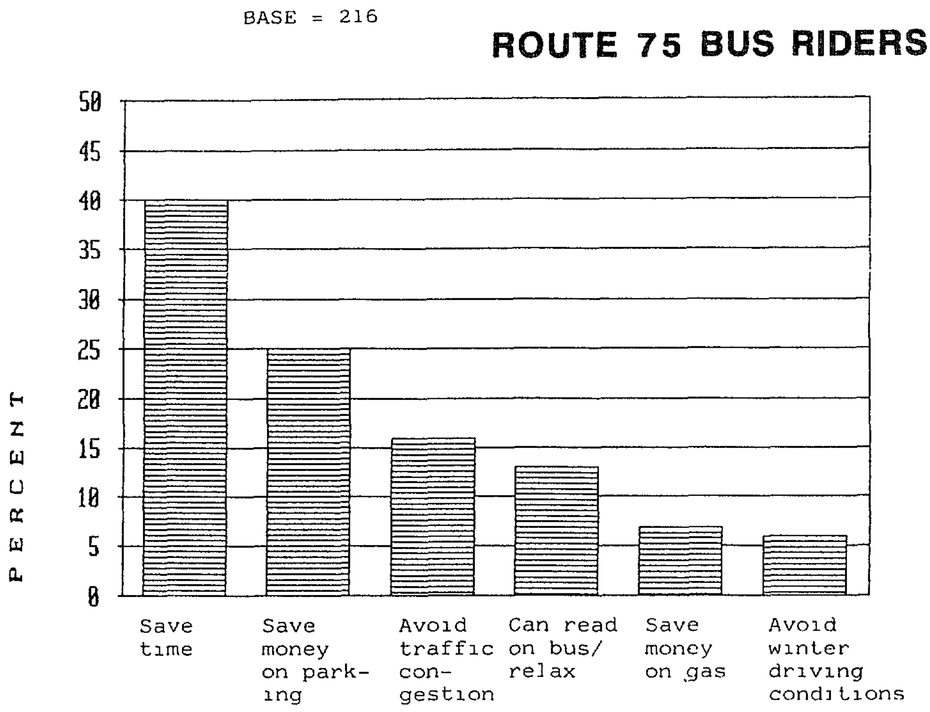
SOURCE: COLLE & McVOY SURVEY MARCH, 1986

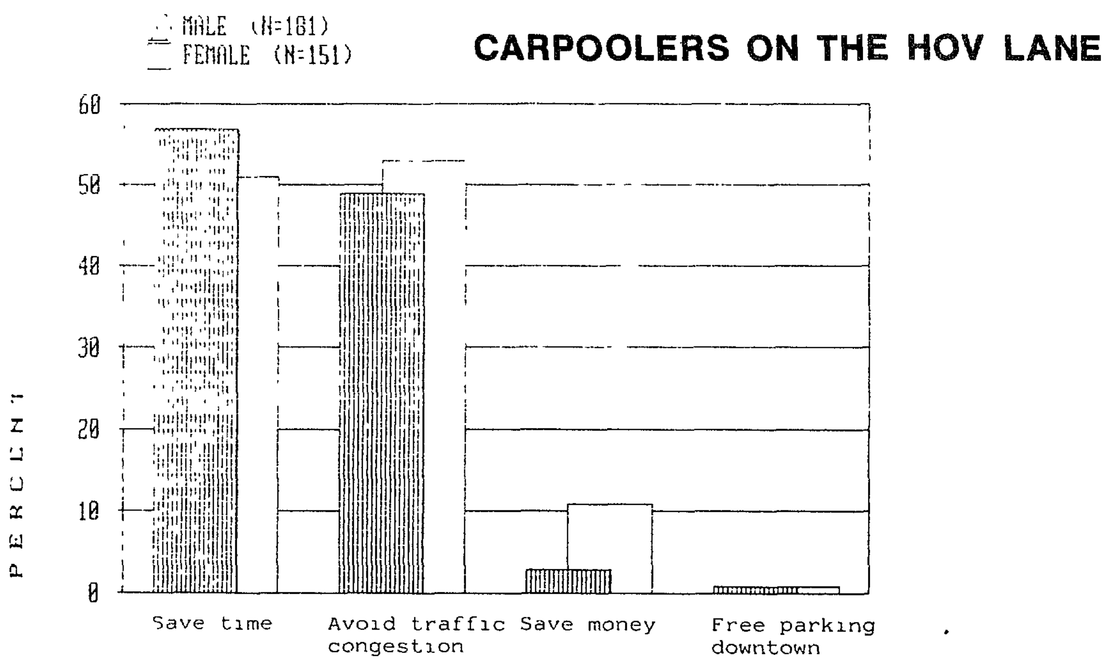
STRGAR-ROSCOE-FAUSCH, INC

MODE OF TRAVEL TO BUS STOP

I-394 CASE STUDY

FIGURE 12





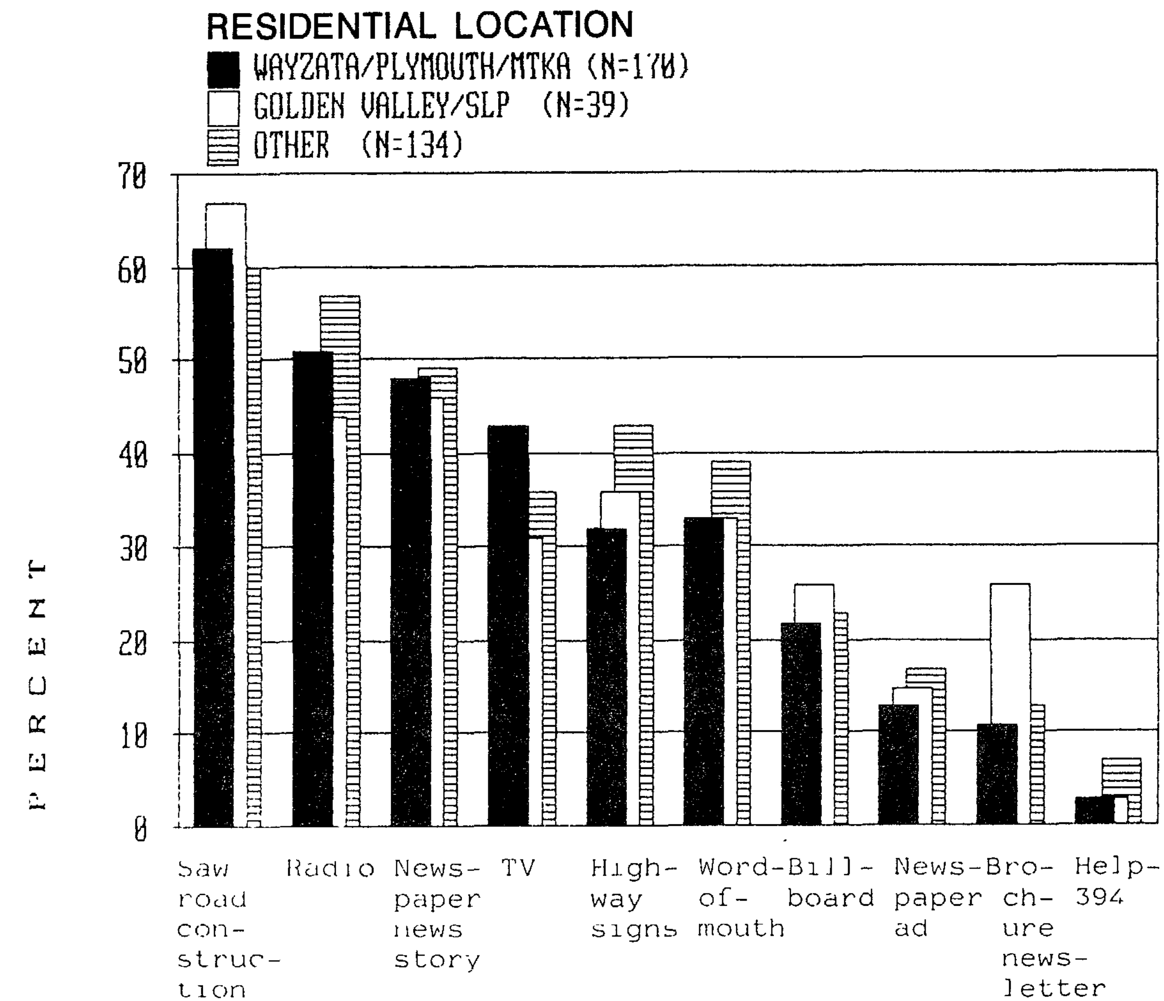
SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC

PERCEIVED GREATEST BENEFIT OF RIDING ROUTE 75 BUS AND CARPOOLING IN HOV LANE

I-394 HOV LANE

FIGURE 13



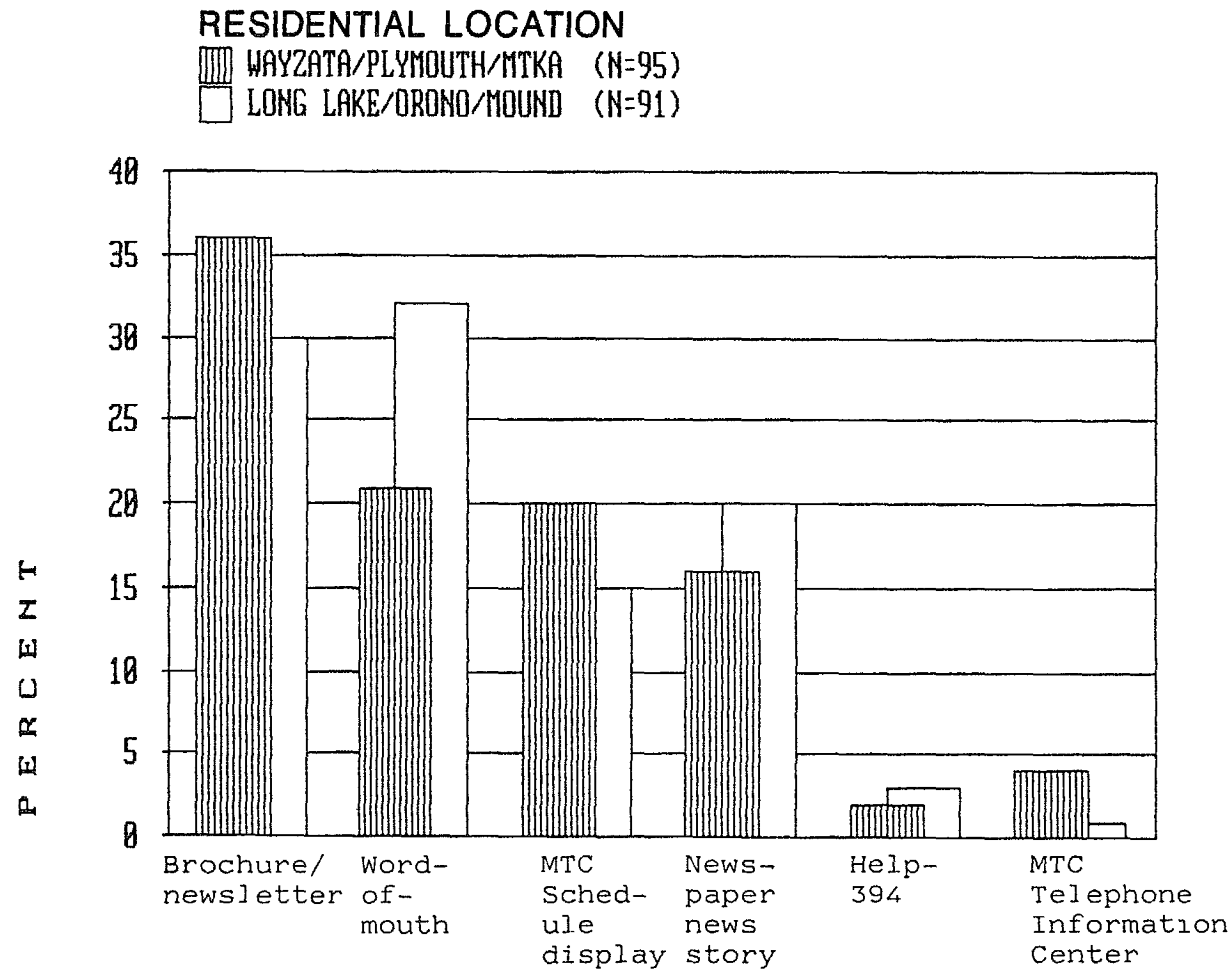
SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC.

MEDIA USED TO FIRST LEARN ABOUT THE HOV LANE

I-394 CASE STUDY

FIGURE 14



SOURCE: COLLE & McVOY SURVEY MARCH, 1986

STRGAR-ROSCOE-FAUSCH, INC.

MEDIA USED TO FIRST LEARN ABOUT ROUTE 75 SERVICE

I-394 CASE STUDY

FIGURE 15

NORTHERN NEW JERSEY - I-287 BRIDGE RECONSTRUCTION

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TSM STRATEGIES DURING BRIDGE REHABILITATION OF THE I-287 CORRIDOR; CENTRAL NEW JERSEY REGION

DISCUSSION PAPER AND
WORK PROGRAM
FY '84-'87

PREPARED BY -

Noreen S. Cardinali
Office of Ridesharing

Background -

I-287 in Middlesex, Somerset, and Morris Counties was constructed in the 1960's to connect the New Jersey Turnpike (I-95) with I-78, I-80, and I-87 (the New York State Thruway). It serves as a major north-south highway link in the region. The New Jersey Department of Transportation (NJDOT) will undertake a major bridge rehabilitation project involving 2.8 miles of the road, beginning in the fall of 1984. The project includes the replacement of 4 bridge decks and the resurfacing of two spans over Conrail and Main Street in Bound Brook. The project budget is currently 18.2 million dollars and is scheduled for completion in early 1987.

During the 1984-1985 construction period, all northbound traffic in the stretch will be diverted to what is now the southbound lanes of the highway. Instead of three lanes in each direction, traffic will flow for two lanes in each direction, with a concrete barrier down the center. The loss of the shoulders will probably worsen the congestion. Once the six bridges on the northbound section of the roadway have been repaired, in approximately one year, the four-lane traffic flow will be diverted onto the northbound side, in order to allow similar repairs to take place on the southbound section,

During the winter of the years since its completion, the concrete bridges on I-287 have been salted to prevent freezing. This salting compound caused considerable damage, not only to the road surface, but also to the foundation of the bridge decks. Unless repairs are made soon, including some actual replacements of the spans, serious accidents could result. It is anticipated that with our current technology, the new spans will have more longevity.

Also during the twenty years since the completion of most of the I-287 corridor, there has been tremendous industrial growth characterized by the exodus of private employers into the suburban corridor area from the more densely populated urban areas. This industrial development is growing beyond the current level of 415 private employers and 130,000 employees located within four miles of I-287 between Perth Amboy and Montville. It should be noted that I-287 has not been completed in the section which is intended to connect Montville with the New York State Thruway (I-87). It is anticipated that the bridge rehabilitation project will result in severe and possibly costly disruptions of traffic with considerable increases in both commuting time delays and commercial transport delays throughout the corridor.

The purpose of this paper is to provide:

a. a detailed outline of the tasks which can be conducted by six-members of the staff of the Division of Public Transportation Services, including the interrelationship of these tasks to those which must be performed by other offices and agencies.

Program Issues -

The various planning tasks as outline below during FY . 84 - 87, are being scheduled for implementation simultaneously. The bureaus of design, engineering, and travel projection will coordinate the traffic operations improvements, while the offices of community involvement and public affairs will be coordinating the public affairs campaign.

In terms of public transportation services, which is the main thrust of this paper, the willingness of private employers and developers to support the ridesharing office will depend upon how closely they see the objectives of the program meeting their own needs, which in turn, depends upon the mix of services provided. The good news is that there are a wide range of options to offer to the various private sector interests that should be part of planning a long-range ridesharing brokerage operation or a transportation management association. The reward. is that traffic operations improvements on arterials and shared ride projects developed using this corridor management approach can yield benefits that last much longer than the rehabilitation period.

Planning Tasks for Mitigation of Traffic Disruptions

1. Final Design of the Rehabilitation Project (Traffic Operations Improvements) -

   - identify preferable alternate routes, if any
   - develop an inventory of deficiencies and a schedule of other road projects which could interfere with traffic on I-287 or nearby arterials
   - conduct surveys to identify origin and destination patterns of vehicles using I-287 or nearby arterials
   - estimate the capacity of the highway and the extent of the delays
   - identify capacity improvements (including intersection improvements, manual intersection control, and off-site police) and delay reduction strategies
   - prepare a traffic operation improvement plan (including the identification of a need, if any, for HOV lanes or ramps before, during, or after the construction period)
   - coordinate with affected agencies and communities
   - fund, publicize, implement, and monitor all traffic operations

2. Public Transportation Services -

   - investigate current level of use in existing shared-ride modes
   - identify the market for all alternate modes (including Carpool, , Vanpool, third party Vanpool, bus, buspool, rail, cycle, and

, walking modes) and facilities (including park and ride/park and pool lots)

- prepare an implementation plan for alternate modes (including attitude surveys, matching services, marketing and promotion, technical assistance and monitor/evaluation)

- evaluate the effectiveness of new services and the employer-based/individual-based programs

- monitor all increases in shared-ride mode usage and vehicle occupancy

- foster the development of program incentives and employer policy commitment on a long-term basis.

3. Public Affairs Campaign -

- conduct community meetings

- publish a project locator map

- disseminate information on alternate travel routes and HOV modes

- participate in radio/TV talk shows before, during, and after the bridge rehabilitation project.

Goals of the Corridor Improvement Program -

The goals of this program are both short-range and long-range. In the short range, the goal of traffic operations is to:

1. reduce the travel time delays which will be associated with the needed construction/rehabilitation project.

2. provide for safe and carefully planned route(s) for vehicular traffic between Bridgewater and Piscataway during the construction period.

3. supervise and coordinate the work of the contractor, thereby assuring the motoring public of long-term rehabilitation with less inconvenience.

In the short range, the goal of public transportation services is to:

1. increase mobility by increasing the vehicle occupancy rate for commuters on I-287.

2. provide complimentary service to transit in the corridor area.

In the short range, the goal of a public affairs campaign is to:

1. inform the public about the need for the bridge improvements.

2. disseminate information pertaining to strategies developed for traffic operation improvements (ie. alternate routes, HOV ramps, intersection improvements, etc.) and for shared ride modes (ie. park and ride/pool sites, commuter matching assistance, etc.).

3. minimize any public or community dissatisfaction directed toward the department's management of the project.

Long range goals include:

1. Permanent travel time improvements on I-287 and its arterials.

2. Permanent increased use of shared-ride modes to 50%, increases in vehicle occupancy for the entire region, and increases in park and ride/park and pool facilities and their usage.

3. Permanent increases in transportation coverage and reductions in energy consumption, traffic congestion and petroleum emissions in the corridor and in the region.

4. Establishment of permanent public awareness and support for long-range commuter assistance strategies in the region.

Objective of the Corridor Ridesharing Program -

To increase the number of poolers and/or transit users in the estimated 415 employers with approximately 130,000 employees within four miles of I-287 between Perth Amboy and Montville by an additional 3,500 - 4,000 to the 28,000 that are estimated to be ridesharing now.

Implementation Tasks for the Corridor Ridesharing Program -

A. Establish a Private Sector Task Force under Chairmanship of Assistant Commissioner for Transportation Services which recommends the policy, organizational structure, resources, and priorities for the ridesharing program.

B. Establish a regional office for commuter assistance which:

   1. defines the 415 employers, their locations, their chief executive officers, their transportation coordinators, if already designated, and the current level of use in existing shared ride modes,

2. coordinates with other departmental offices, consultants, and/or public and private agencies in evaluationing corridor traveler surveys (including non-work trips vs. work and school trips by origin and destination before, during, and after the rehabilitation period) and in informing the employer transportation coordinators on traffic operation improvement, including alternate routes.

3. participates in local advisory committee meetings, when needed.

4. coordinate the development of a corridor-specific marketing plan (including theme, logo, design of highway signs, and material preparation/dissemination). Dissemination of marketing materials should be to employers and all corridor commuters.

5. identify potential park and ride/pool sites (including state-owned and NJ Transit owned or leased lots), especially at interchanges of radial freeways.

6. assist in negotiating joint-use arrangements for commercial or universtiy-owned potential park and ride/pool lots.

7. conduct employer executive interviews/briefings to obtain ridesharing program commitment or to isolate management's interest/concerns about employee transportation.

8. conduct attitude surveys, when needed, to identify drive-alone and pooler ridesharing concerns by association with respondent characteristics; thereby, isolating program policy changes which may need to be made.

9. train employee transportation coordinators to manage their in-house program.

10. conduct matching/origin and destination surveys with assistance from ETC's.

11. analyze the survey results, disseminate matching information to coordinators and employees, and make policy recommendations to executives, which will provide internal incentives for participation in the program.

12. establish a commuter service/information center, including a well-publicized local Hot-line phone number and an on-line computer and printer for fast response time to employers and individual commuters. The computer can also be used to store data related to program evaluation.

13. coordinate regional third party Vanpool services, as market is developed.

14. evaluate the effectiveness of the coordinators and the overall program cost-effectiveness, in conjunction with program goals.

15. obtain long-term in-kind contributions and/or additional funding from federal, county, and local agencies and from private sector employers, developers or universities for administrative and operating expenses of the office.

16. expand program if necessary, to include schools and other public agency employers. This includes training of coordinators for the attainment of expansion objectives.

17. review and redefine objectives-and work program based on staff experiences and newly acquired priorities of the task force.

Notes -

Tri-Met Rideshare Project Status Report; September, 1982, Prowda, Bob pp. 63 - 70.

Study of Alternate Transportation Strategies During Reconstruction of the Parkway East, I-376, Pittsburgh, Pennsylvania; March, 1983; GAI Consultants, 'Inc. and Carnegie-Mellon.University, pp. 1, 17-20 Final Report and Executive Summary.

DETROIT - LODGE FREEWAY

THE NEW LODGE

by
Paul Scott
Highway Engineer

Traffic Engineering Applications Branch
Traffic Engineering Division
Office of Traffic Operations

September 1986

THE NEW LODGE

The Michigan Department of Transportation (MDOT) is reconstructing a 7.8 mile section of Detroit's John C. Lodge (US-101 Freeway between I-75 and Wyoming Avenue. (See the attached map).

The Lodge was built in the 1950's with a life expectancy of about 25 years. Much of the pavement is now more than 30 years old. Patching was considered in lieu of major reconstruction but the surface and base of the Lodge have deteriorated so badly that patching would fail rapidly along the aging joints and seams.

THE WORK

Reconstruction of the Lodge commenced in April 1986 and will continue throughout the 1987 construction season. There will be no work between the seasons and the freeway will be totally open to traffic.

The work is being accomplished under three separate contracts. Two contracts are for the 1986 work, and one is for work to be done in 1987. The 1986 work is estimated at $14 million and the 1987 work at $25 million. The Federal government will pay 77-25 percent of the cost using Federal-aid Primary System funds, the State will pay 19.91 percent, and the City of Detroit will pay 2.84 percent.

The 1986 construction is being performed by the Midwest Bridge Company and several subcontractors. Midwest Bridge submitted low bids of $6.9 million for the northbound construction and $6.4 million for the southbound work. Work consists of:

- Widening the outside shoulders to 12 feet.
- Constructing a 44 inch high concrete safety shaped barrier wall on the outside edge of the shoulders. (The Lodge is a depressed freeway, hence, the barrier wall will shield the steep cut slopes created by widening within existing right-of-way).
- Removing an existing roll curb adjoining the outside travel lane. (This will provide a flatter temporary shoulder slope than previously planned).
- Extending and upgrading the drainage system.
- Cleaning and inspecting the storm sewer system to determine the extent of repairs required when the freeway pavement is removed and replaced in 1987.
- Constructing bridge piers for improvements to be completed at the Livernois and Davison interchanges in 1987.
- Resurfacing ramps at the Glendale, Milwaukee, and Chicago interchanges.
- Reshaping and erosion control.

In 1987, the following work will be performed by a yet to to be selected contractor:

- o Removal and replacement of pavement in all lanes. (This will require the freeway to be closed in one direction at a time while the work is taking place).
- o Replacement of bridge decks at the Davison interchange.
- o Completion of improvements begun in 1986 at the Liwernois and Davison interchanges.
- o Pavement patching and joint repair on a new section of the Lodge to the north of the reconstruction project limits. .
- o Landscaping embankments.

The northbound lanes will be replaced first starting in mid-April of 1987 and continuing until late July. The freeway will then be open for two weeks in both directions while the contractor reverses his equipment for work on the southbound lanes. The southbound *lanes* will be replaced starting in early to mid-August and will continue until completed in early November.

It was initially planned to close the entire 7.8 mile section of the Lodge Freeway during the 1985 construction season and perform the reconstruction in about seven months. Downtown merchants strongly protested this plan. Nonetheless, MDOT went ahead and advertised for bids. When the bids came in much higher than expected, it was decided to reject them and re-evaluate the project.

LODGE-ABILITY

Out of the ashes of the initial plan came a new approach. James P. Pitz, MDOT Director, was quoted as saying:

> "Previous freeway projects have left motorists frustrated over unannounced closings and delays ... we're not going to do business as usual."

The new approach in Michigan resulted in:

- o A poll of 800 Lodge users by Frank Magid & Associates of Des Moines, Iowa, under contract to MDOT, which indicated (a) that many were not aware of the proposed construction, and (b) that most recognized the need for reconstruction and would welcome it despite the possible inconveniences.
- o The hiring of a public relations expert, Brenda Peek-Redhead, to work with the media and others to assure that the public was kept well informed.
- o Numerous MDOT meetings with merchants, hospital administrators, airport officials, and other concerned citizens.

- Development of the existing construction plans which spread the work out over two construction seasons.

- The creation of Lodge ability.

Lodge ability is defined by MDOT as:

> "The ability to get through, over and around the construction we've all been waiting for on the Lodge Freeway."

Lodge ability is a well financed campaign to educate the public on what it might expect during the two year reconstruction period. ($610,000 of Federal, State, and City funds have been earmarked for this purpose). The completed project is being referred to as "The New Lodge." To assist MDOT with Lodge. ability while the New Lodge is under construction, much of the work has been contracted to the Southeast Michigan Council of Governments (SEMCOG).

The SEMCOG work, under the direction of Donn Shelton, has included:

- Numerous presentations to community groups explaining what is going on and why. (A slide presentation was developed to enhance these presentations).

- Meetings with community leaders and interested citizens.

- Informational signs on highways and streets.

- The distribution of posters, brochures, and other informational material.

- Briefings for the media and the availability of readily accessible MDOT and SEMCOG contact persons.

- Public service announcements for radio and television.

- A traffic information hotline, 93-LODGE, available 24 hours a day to keep motorists informed about conditions on the New Lodge Freeway. There have been about 175-200 calls a week on this line.

A luncheon was held for media representatives and they are contacted daily by Brenda Peek-Redhead and/or Donn Shelton. As a result the media response has been very positive. There seems to be a general attitude that MDOT is doing everything possible to reduce inconveniences and make life tolerable for the motorists.

An ombudsman is also on hand to work with community organizations and individuals on home or business problems related to noise, dust, cracked walls, or other things perceived to have been caused by the reconstruction.

TRAFFIC MANAGEMENT

During 1986, the three southbound lanes are being kept open during the morning rush and the three northbound lanes are being kept open during the evening peak. These lanes have temporarily been narrowed from 12 feet to 11 feet, and 3 feet have been taken from the median adjacent to the concrete median barrier, in order to provide a 6 foot emergency shoulder between the outside travel lane and the existing roll curb.

The only lanes that may be closed are the lanes adjacent to the outside shoulders, and they may only be closed during non-peak periods at locations where construction is in progress. Lanes are blocked off using plastic barrels. There have been problems created by drivers exceeding the 45 mph speed limit, hitting barrels, and/or driving in the closed lanes behind the barrels. Traffic reporters from the media have helped by urging Lodge users to respect the safety of the workers by driving in a responsible manner. Nonetheless, the problem remains.

In addition to the above traffic controls, no two consecutive exit or entrance ramps are closed at any one time, and all lanes are kept open for special events, such as the Grand Prix auto race, Tiger baseball games, and the Freedom Festival.

During 1987, all lanes and ramps will be closed, first in the northbound direction from April-July then in the southbound direction from August-November.

In addition to traditional signs, markings, lane closures, detours etc., the following traffic management strategies are being used or will be used within the New Lodge corridor:

- Alternate Routes. There are a number of good alternate routes in the Lodge corridor. Motorists are being urged to become familiar with these routes. This will be extremely important in 1987 when portions of the Lodge are shut down.

  Suggested alternate routes, as shown on the attached map, are (a) Southfield (M-39) and Jeffries (I-96) Freeways--the official detour route, (b) Grand River Avenue, (c) Woodward Avenue, and (d) Crysler (I-75) Freeway.

  It is believed these alternate routes have the capacity to handle about 78 percent of the vehicles expected to be diverted from the Lodge in 1987. It is hoped that ridesharing (Carpools, Vanpools, and buses) and the use of other city streets will take care of the rest. Even so, the overall estimated travel time for a trip is expected to be about 20 percent more (i.e., 12 minutes longer for an hour trip).

  To help improve the capacity on the alternate routes, the following traffic engineering and operational improvements are being or will be made:

  Resurfacing of 2.8 miles of Grand River Avenue.

  Development of a connector route from the Ford (I-94) Freeway at Trumbull Avenue to the Ford Hospital and improvement at the John R exit from the Ford Freeway.

  New signing for the reversible lane on Grand River Avenue.

Retiming traffic control signals on Woodward and Grand River Avenues, first to favor northbound traffic and then southbound traffic when the work on the northbound freeway is completed.

There is some concern about the security of motorists using the alternate city streets. Street lighting is considered to be very good along these routes and discussions are underway with the Detroit Police and the Michigan State Police relative to improved security measures.

Since the beginning of the reconstruction in April, approximately 19 percent or 24,000 vehicles per day have "disappeared" from the Lodge. It is assumed that many of these motorists have already begun using alternative routes or ridesharing modes to commute, As a result of this decrease in vehicles on the Lodge, average speeds have increased, causing some concern for the safety of the workers.

o <u>Carpooling and Vanpooling</u>. SEMCOG, since 1980, has been providing free carpooling and vanpooling services in the Southeast Michigan area through a program called RideShare. Rideshare is a computerized service which matches car and vanpooling partners by working with the region's employers. The service is also available through a "hot line" number, 963-RIDE which is posted on signs located on the region's major roadways.

SEMCOG, using National Ridesharing Demonstration Program funds made available by the Federal Highway Administration (FHWA), has moderately increased carpooling and vanpooling efforts in the Lodge corridor in 1986. They have primarily attempted to educate motorists about the project and get people into ridesharing situations through Pool. ability.

Pool ability is defined by SEMCOG as:

"The ability to save money, make friends and get to work on time -- through RideShare -- while the New Lodge is being completed."

Brochures and posters have been distributed. Also some employers have been contacted. Several employers who have been inaccessible in the past have expressed an interest in ridesharing as the result of the Lodge reconstruction.

In 1987, when the Lodge will be totally closed, SEMCOG will significantly increase its ridesharing efforts in the corridor, working extensively with major employers and major buildings in the corridor. These efforts will include employer seminars and programs. No statistics are yet available on the success of Pool-ability in removing vehicles from the Lodge corridor.

o <u>Public Transportation</u>. In cooperation with MDOT, the Detroit Department of Transportation (DDOT) in Detroit and the Southeast Michigan Transit Authority (SEMTA) in the suburbs are providing bus service along various routes to and from the downtown area. The routes and the schedule are essentially the same as before reconstruction on the Lodge began. MDDT and the FHWA are considering the feasibility of subsidizing expanded bus service during the 1987 construction season.

- Tow Trucks. Two tow trucks, one on the southbound section and one on the northbound section are in operation 24 hours a day to assist Lodge motorists. There was a bid item in the contract for "tow trucks." Midwest Bridge Company, general contractor for the 1986 construction season, engaged the services of Boulevard & Trumbull Towing, Inc. of Detroit to patrol the highway and quickly remove stranded vehicles, provide two gallons of gasoline if needed, change flat tires, etc. These two trucks are responsive to MDOT and Michigan State Police calls for assistance,

  The tow trucks have responded to about 100 calls a week since the reconstruction began. Community response to their activities has been very positive.

- Ramp Meters. Ramp meters were installed on the Ford (I-94) Freeway several years ago. Since that time traffic flow has improved considerably on the Ford during peak travel hours when the meters are in operation. Based upon this good experience, the system was expanded to the Lodge Freeway to enhance the reconstruction.

  Ramp meters have been installed at 23 entrance ramps within the New Lodge project limits. Brochures and other public information have been provided to tell motorists how to respond to the ramp meters and explain why they work so well. They are used only during the peak traffic hours. To date the effectiveness of the ramp meters on the Lodge has not been determined.

- Changeable Message Signs. Changeable message signs are being used on a continuous basis to relay messages of importance to the motorists. Messages include information about lane closures, requests to obey the speed limit, etc.

- Incentive/Disincentive Clauses. The contracts for the New Lodge contain inventive/disincentive clauses which provide the contractor $12,000 a day for each day the contracts are completed before the scheduled date, or penalize him $12,000 a day for each day the project is finished late.

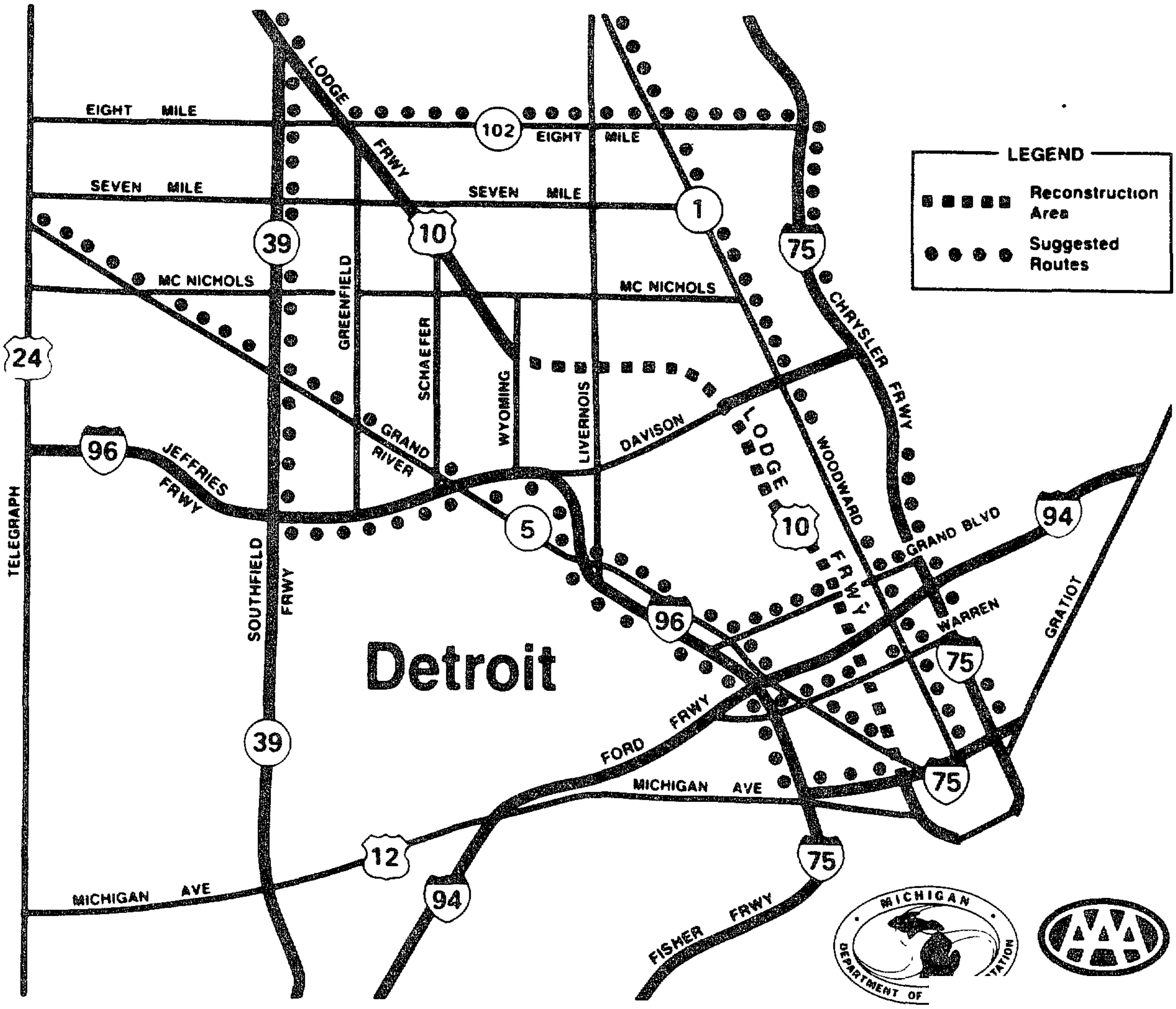
BEYOND THE LODGE

Lodge-ability to date has been an overwhelming success. MDOT has emerged as a caring, capable organization. The media have been very supportive. Motorists have been very understanding and apparently are generally pleased with what is going on.

Hopefully, these good responses will continue because the New Lodge work is the first of much anticipated reconstruction work in Detroit in the near future, The New Ford (I-94) Freeway will probably be next, followed by the New Southfield (M-39) Freeway and others.

The New Lodge has been set up as a model for future highway projects in Michigan. Its success or failure will influence many future projects, not only in Michigan but throughout the entire country.

Lodge Open During 1986 Work With Alternate Routes Available



Shoulder and slope work on a 7.8-mile stretch of Detroit's Lodge Freeway (U.S. 10) between I-75 and Wyoming Avenue begins in mid-April on the northbound side and in May on the southbound side. Motorists will be able to use the freeway during this year's work, which will be done on both sides in sections and is scheduled for completion by October. During construction, the freeway will be reduced from three to two lanes daily except during peak weekday travel times. On weekdays, three lanes will be open southbound from 6 to 9 a.m. and northbound from 3 to 6:30 p.m. In addition, all lanes will be open during the Grand Prix weekend (June 20-22) and during the July 2 International Freedom Festival's giant fireworks display. Suggested alternate routes include: Grand River Avenue, Woodward Avenue, I-75 and a route using the Jeffries (I-96) and Southfield (M-39) freeways. Motorists are advised that construction also is planned on portions of each suggested alternate route sometime this year. This year's Lodge work will prepare the freeway for repaving which will require its closing—one direction at a time—during a seven-month period starting in mid-April in 1987.