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High Occupancy Vehicle Treatments, Impacts, and Parameters (A Synthesis)

Volume II: Bibliography and Data

August 1986

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16. Abstract

This two volume report details the findings of 256 past and present high occupancy vehicle treatments which have been implemented. Volume I contains the procedures followed and the major conclusions found concerning the 19 specific HOV treatment types which were studied. Some of these conclusions are that only five treatments (park-n-ride lots, separate roadways, contraflow freeway and arterial lanes, and preferential bypass at a metered ramp) produced the impacts which were expected. Another seven treatments either produced mixed results or had no effect on the expected impacts, while the remaining six HOV treatments had no reportable data collected or were never implemented.

Findings concerning specific HOV treatments included: it was generally found that transit malls/auto restricted zones must have an operating transit system on the street and a major pedestrian generator for it to be effective; reserved lane operations must not affect reverse flow traffic and should be physically separated from peak direction traffic to be effective;contraflow lanes usually have safety problems during off-peak hours or where major turning movements or pedestrian activity exists; concurrent flow lanes usually need major transit use or a large increase in occupancy to be effective; and finally, a much greater effort must be made by both traffic engineers, planners, and researchers to obtain pertinent information about HOV preferential treatments.

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Volume II contains a comprehensive bibliography along with a listing for each HOV treatment cited which includes the year implemented, size, priority cutoff, hours of operation, current status and any before and after data concerning the impacts which the treatments may affect.

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QUESTIONNAIRE PACKAGE

A questionnaire which was to be used to determine the opinion of local representatives of the state of New Jersey about HOV preferential lanes was drafted. A pilot study was performed among personnel within the Department of Transportation to determine if the questionnaire was understandable and to the point.

Since HOV preferential treatments are relatively new, a few recommendations were made by the respondents of the pilot study about the questionnaire. First specifics, such as what the hours of operation of the treatments should be, cannot be answered by respondents who are not familiar with certain treatments. Also, questions about the benefits, both costs and time, cannot be adequately answered for the same reason.

Respondents were asked to do several rankings. Most of these rankings contained more than ten items and it was recommended by many respondents that this was too many items to rank comprehensively. Therefore, the number of items should be reduced or rather than ranking the items against each other, they should be ranked by the respondent's support for each individual item and then the responses grouped. In this way, an overall rank could be obtained and the method is much easier for the respondents.

The final recommendation from the pilot study was also about rankings. The negative impacts associated with HOV preferential treatments were to be ranked. However, there was much confusion about how to rank them, most negative to least negative or the opposite. Again, it was recommended that the importance for each individual impact should be asked and then all the responses could be grouped to determine the rankings.

After these changes where made, the final package was prepared. It included a cover letter, a description of the HOV treatments, a list of the possible impacts, the questionnaire itself and a form for the respondents to request the findings of the study. Also, prepared was the reasoning for each question on the questionnaire. All of this material follows.

After the pilot study was done, the decision was made that because of the unfamiliarity of the HOV preferential treatments, personal interviews would be more appropriate in determining the data needed. In this way, the HOV preferential treatments could be better explained to the respondents making for more informed and applicable responses. Thus, the questionnaire package was scrapped.

DRAFT

Dear :

The Department of Transportation is seeking to learn more about public attitudes towards high occupancy vehicle (HOV) treatments, such as preferential lanes and toll reductions for carpools, vanpools, and buses.

Historically, state and local governments have sought to solve traffic congestion problems by constructing new roads and expanding existing one. Because financial resources failed to measure up to overall needs, many needs have been unmet and there has been a growing recognition that strategies to reduce the growth in vehicular traffic must be pursued as well. One such strategy is the implementation of high occupancy vehicle (HOV) Treatments which are becoming a widely accepted practice nationwide. These improvements encourage the use of carpools, vanpools, and public Transit and thus help move more people in fewer vehicles. However, negative impacts often accrue to low occupancy vehicles, such as inconveniences and Travel delays when HOV improvements are implemented.

The enclosed questionnaire is being sent to the State Senators and Assemblymen, County Freeholders, Authority Directors, and Mayors statewide to solicit attitudes about the various types of preferential treatments for HOV's. The responses received will help the Department define which types of treatments might have application in different areas of the state. Thus, your reply would be most appreciated. Also enclosed for your convenience in returning the questionnaire is a stamped, self-addressed envelope.

You may receive a copy of the results of this questionnaire by filling in the enclosed request slip and mailing it along with your questionnaire. The number at the top of the questionnaire will be used for follow-up of unreceived questionnaires. However, the numbered listing will be destroyed at the end of the return period to maintain your anonymity.

We thank you for your time. If you have any questions concerning the questionnaire or subject matter, please contact Mr. Thomas Batz of this Department at (609) 292-5722.

Sincerely,

Commissioner of Transportation

TMB

HIGH OCCUPANCY VEHICLE (HOV) PREFERENTIAL TREATMENTS - The following improvements are designed to give people who carpool, vanpool or use public transportation preference during their trip over a person who does not. These treatments are generally installed for the peak periods of the day when congestion exists and require only minimal cost outlays and a relatively short time to implement.

A. Economic Preferential Treatments - Treatments which primarily make a specific trip more inexpensive to the high occupant vehicle (HOV) users.

1. Preferential Toll Charges - Increasing the toll on a facility for low occupancy vehicle users or reducing the toll for HOV users.

2. Preferential Freeway Congestion Pricing - Charging a fee to low occupancy vehicle users to travel a congested section of freeway which before was free to use. HOV users would continue to travel free of charge.

3. Preferential Parking Pricing - Increasing the fee a low occupancy vehicle user pays to park his car off the street or reducing the parking fee for HOV users.

B. Convenience Preferential Treatments - Treatments which primarily make a specific trip more convenient for the HOV users.

1. Park and Ride Lots - Centralized parking lots where HOV users may park and transit service is available.

2. Preferential Parking - Setting aside of the most desirable parking spaces for HOV users. Applicable at large employers, transit station parking areas and shopping malls.

C. Space Preferential Treatments - Treatments which primarily reserve an area only for HOV users and require low occupancy vehicle users to change their route.

1. Exclusive Freeway Ramps - Reserving an existing freeway ramp to only HOV users.

2. Transit Malls - Reserving a street for transit and HOV vehicles only. Principally used within a CBD shopping area or a heavy transit transfer area.

3. Auto Restricted Zone - Restricting all auto traffic within a defined area of a city, with public transit, and sometimes HOV vehicles excepted. Much larger area restricted than a transit mall.

4. Reduced Parking with Priority - Reduction in available parking spaces with priority given to HOV users.

5. Turning Movement Restrictions - Restricting a turning movement to only HOV users.

D. Time Preferential Treatments - Treatments which primarily reduce the travel time for HOV users for a specific trip without requiring non-HOV users to change their route. A few of these treatments require new construction.

1. Separate Roadway - Building a roadway, usually in the median of an existing freeway, for the exclusive use of HOV users.

2. Contraflow Freeway Preferential Lane - Reserving a freeway traffic lane of the off-peak direction of travel for the exclusive use of HOV users.

3. Contraflow Arterial Preferential Lane - Same as above except on an arterial street.

4. Concurrent Flow Freeway Preferential Lane - Reserving a freeway traffic lane of the peak direction of travel for the exclusive use of HOV users.

5. Concurrent Flow Arterial Preferential Lane - Same as above except on an arterial street.

6. Exclusive Bypass Ramp - A ramp built exclusively for HOV users to bypass a congested ramp. Usually done in conjunction with a preferential lane.

7. Preferential Bypass at a Metered Ramp - Reserving the shoulder of a ramp which meters traffic onto a freeway for HOV users to bypass the queue on the ramp.

8. Toll Facility Preferential Lane - Reserving a toll booth for the exclusive use of HOV users to bypass the queue at the toll plaza.

9. Signal Preemption - Traffic signal controls which are actuated by transmitters located on transit vehicles. Extends the green phase for the transit vehicles, thus reducing the delay.

IMPACTS OF HOV PRIORITY TREATMENTS

POSITIVE	NEGATIVE
- Increase person carrying capability	- Increase adminstration costs
- Increase bus transit use	- Increase non-HOV operational costs
- Increase bus transit reliability	- Increase delays for non-HOVs
- Increase carpooling and vanpooling	- Increase transit operating costs
- Increase safety	- Increase government's operation costs
- Reduce the need for future expansion of the roadway	- Increase weaving movement
- Reduce congestion	- Increase enforcement costs
- Reduce future capital costs	- Increase parking needs
- Reduce auto use	- Increase energy use initially
- Reduce travel time	- Increase accidents initially
- Reduce travel cost	- Decrease in comfort and convenience to non-HOVs
- Reduce energy use	- Decrease air quality initially
- Improve air quality	- Decrease noise quality initially
- Improve noise quality	- Diversion to other routes
- Improve comfort and convenience for HOVs	- Inconvenience to residents of affected area
- Improve pedestrian and bicycle traffic	- Hamper commercial deliveries
- Enhance local commercial access and activity	- Negative media coverage
	- Court actions initiated

HIGH OCCUPANCY VEHICLE TREATMENTS QUESTIONNAIRE

Type of Representative: ☐ State ☐ County ☐ Municipal
Type of Area: ☐ Rural ☐ Urban
County Represented: _____

Is the addressee completing this questionnaire?

☐ Yes ☐ No

If no, are your primary duties transportation related?

☐ Yes ☐ No

Should certain vehicles, simply because they are carrying more people, be given preference over the remaining transportation users?

☐ Yes ☐ No

If yes, which vehicles should be given preference?

☐ Buses Only
☐ Buses and Vanpools Only
☐ Buses, Vanpools, and 3+ Occupant Carpools
☐ Buses, Vanpools, and 2+ Occupant Carpools
☐ Other (Specify) _____

Below is a list of transportation attributes. Please mark how important you feel each attribute is to your constituency.

ATTRIBUTES	ABSOLUTE IMPORTANCE	GREAT IMPORTANCE	SOME IMPORTANCE	NO IMPORTANCE	DON'T KNOW
Energy Impact					
Bus Reliability					
User Travel Time					
Capital Costs					
Noise Impacts					
Comfort and Convenience					
Government Operational Costs					
Roadway Capacity					
Local Commercial Activity					
Air Quality Impacts					
Pedestrian and Bicycle Travel					
Safety					
User Travel Cost					
Transit and Carpool Use					

Listed on the left are 14 transportation objectives. For each objective, pick up to three transportation improvements (listed on the right) which you could support. Mark the letter of the improvement which you could most support for that objective in Column 1, the second most supported in Column 2, and the third most supported in Column 3.

OBJECTIVES	1	2	3
Minimize Travel Time			
Minimize Travel Cost			
Maximize Safety			
Maximize Transit and Carpool Use			
Maximize Pedestrian and Bicycle Travel			
Maximize Comfort and Convenience			
Minimize Capital Costs			
Maximize Local Commercial Accessibility & Activity			
Minimize Air Quality Impacts			
Minimize Noise Quality Impacts			
Minimize Operational Costs			
Minimize Energy Use			
Maximize Person Movement Capacity			
Maximize Bus Reliability			

IMPROVEMENTS

A. Reconstruct Shoulders for Traffic Use
B. Reconstruct Hazardous Locations
C. Institute Convenience HOV Treatments (e.g., Park and Ride Lots, Preferential Parking)
D. Institute Space HOV Treatments (e.g., Transit Malls, Auto Restricted Zones)
E. Institute Time HOV Treatments (e.g., Preferential Lanes, Bypass Ramps)
F. Construct Additional Traffic Lanes
G. Institute Economic HOV Treatments (e.g., Preferential Tolls and Parking Charges)
H. Expand Transit System

Please state any negative impacts whose existence would cause a transportation improvement to be eliminated from consideration and explain why below.

_____

_____

_____

_____

_____

Below is the list of HOV preferential treatments. Please mark the level of support you feel your constituency would have for each treatment.

TREATMENTS	STRONGLY SUPPORT	SOMEWHAT SUPPORT	SOMEWHAT AGAINST	STRONGLY AGAINST
Preferential Toll Charges				
Preferential Freeway Congestion Pricing				
Preferential Parking Costs				
Park and Ride Lots				
Preferential Parking				
Exclusive Freeway Ramps				
Transit Malls				
Auto Restricted Zones				
Reduced Parking with Priority				
Turning Movement Restrictions				
Separate Roadway				
Contraflow Freeway Preferential Lane				
Contraflow Arterial Preferential Lane				
Concurrent Flow Freeway Preferential Lane				
Concurrent Flow Arterial Preferential Lane				
Exclusive Bypass Ramp				
Preferential Bypass at a Metered Ramp				
Toll Facility Preferential Lane				
Signal Preemption				

Please write in any HOV preferential treatments which you are familiar with but which were not listed above.

_____

_____

_____

Please list any specific locations which you are familiar with that you feel need to be studied for implementation of an HOV preferential treatment. List the specific treatment that you feel would be appropriate for each location.

Route	Municipality	HOV Preferential Treatment

Thank you for your assistance and feel free to use the space below for any additional comments.

Please send a copy of the results of this questionnaire to:

Name_____

Address_____

_____

_____

QUESTIONNAIRE JUSTIFICATION

Page 1

Section 1 - To group respondents' other answers.

Section 2 - To determine if any engineering personnel answered the questionnaire so that we can differentiate between them and political personnel.

Section 3 - To determine if the respondents will accept discrimination against people in low occupant vehicles. Will use to group respondents. The second question's responses can be used in the planning of HOV treatments.

Section 4 - To determine which of the transportation attributes are the most important to the respondents. Since it is known which transportation improvements usually address each attribute, this information can be used to determine which types of improvements would be more supported by the respondents if there was a choice to be made between improvements.

Page 2

Section 1 - To determine which improvements, including HOV treatments, the respondents think best address the transportation attributes, especially the ones they marked as the most important the question before. The results will also be used to evaluate the need for an educational program concerning the HOV treatments and their attributes.

Section 2 - If a certain negative impact's existence was noted as being the cause of an improvements being dropped from consideration, then any HOV treatments with this impact could be isolated in the study.

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Section 1 - Will show which treatments are supported by the respondents and should be studied and implemented in the future.

Section 2 - Gives the respondents a chance to state any treatments which they think are important but are not included in the list. These additions could then be added to the study.

Section 3 - Locations cited here by the respondents can be used later in the study for implementation of HOV treatments.

QUESTIONNAIRE JUSTIFICATION (CONTINUED)

Section 4 - This is for any comments the respondents have about HOV treatments which may not have been covered in the other questions.

APPENDIX C

PRESENT AND POSSIBLE LOCATIONS FOR HOV PRIORITY TREATMENTS

From the information obtained during the interview phase of this project, it was found that a number of HOV preferential treatments are now or have been in existence in the areas covered by the metropolitan planning organizations. The following describes these treatments.

Park and Ride Lots - The Delaware River Port Authority, Wilmington Metropolitan Area Planning Council, New Jersey Department of Transportation and New Jersey Transit all operate such lots in many areas of the state.

Preferential Toll Charges - The Delaware River Port Authority has reduced its regular $.75 fare across the bridges between New Jersey and Pennsylvania to $.40 for carpools with three or more occupants. Commuter buses also receive a ten percent discount.

The Port Authority of New York and New Jersey in 1975 increased its fare across the bridges between New Jersey and New York from $1.00 to $1.50 while at the same time offered reduced fare tickets to carpools with three or more occupants. The tickets cost the carpooler only 50¢ per trip.

Preferential Parking - The parking garages in Philadelphia reserve parking bays near the entrances and exits for vanpools.

Auto Restricted Zones - Chestnut Street in Philadelphia has an auto restricted zone for approximately 1.5 miles. This section is in the business district where in the past congestion had been extremely heavy. Buses are the only vehicles which are allowed to use the section.

Concurrent Flow Arterial Preferential Lane - A preferential lane exists for approximately one mile on US Route 9 approaching Ernston Road in Middlesex County. When Route 9 was expanded from four to six lanes, the right-hand lane in both directions, approaching the traffic signal which causes congestion, was reserved for priority use. The preferential lane allows buses and 3+ carpools to bypass this congestion.

A preferential lane exists for approximately one-half mile on US Route 22 approaching New Providence Road in Union County. It uses the right-hand shoulder approaching a traffic signal, which causes congestion. The preferential lane allows buses only to bypass this congestion.

A preferential lane had been implemented on Vine Street in Philadelphia for one half a mile. Buses only are allowed to use the rightmost lane to bypass the congestion along this section caused by the traffic signals.

Toll Facility Preferential Lane - A preferential lane exists for approximately two miles on Interstate Route 495 between the New Jersey Turnpike and the Lincoln Tunnel in Hudson County. It utilizes the leftmost lane of the three lane westbound roadway to bypass the eastbound congestion caused by the Tunnel toll plaza. Only buses are allowed to use this lane.

Concurrent Flow Freeway Preferential Lane - A preferential lane exists for approximately one mile on Interstate Route 95 approaching the George Washington Bridge toll plaza in Bergen County. Buses are allowed to use the right-hand shoulder on the upper level approach to bypass the queue

from the toll plaza. A plan has been proposed to allow three or more occupant carpools to use the preferential lane and include toll plaza preferential treatment. This plan will be implemented in the near future.

A preferential lane had been implemented for approximately 12 miles on the Garden State Parkway in Union and Middlesex Counties. When the Parkway was widened from six to eight lanes, the leftmost lane in each direction was reserved for three or more occupant vehicles to bypass congestion in this section. The preferential treatment was discontinued after 1-1/2 years.

The representatives also gave specific areas or locations where HOV preferential treatments should be studied and could be successful. The following lists these areas:

Park and Ride Lots - Rest Area on Interstate Route 295 near the Delaware Memorial Bridge; along the corridors leading into Atlantic City; along the US Route 9, the Interstate Route 78, and Interstate Route 80 corridors; in mall parking areas throughout the state.

Preferential Toll Charges - Delaware Memorial Bridge, Atlantic City Expressway and the Garden State Parkway.

Preferential Parking - Atlantic City, the two large Salem County industries' parking lots, mall parking areas throughout the state and in the downtown areas.

Toll Facility Preferential Lane - Toll plazas along the Atlantic City Expressway and the Garden State Parkway and at the George Washington Bridge, Lincoln Tunnel, Delaware Memorial Bridge, and the river crossings into Philadelphia.

Auto Restricted Zones and Transit Malls - One is being studied on Pacific Avenue in Atlantic City between Baltic Avenue and Arctic Avenue. Also, the Bridgeton waterfront and the downtown areas of Newark and Planifield.

Concurrent Flow Arterial Preferential Lane - One has been planned for Market Street in Philadelphia but has not been implemented. Another is being planned for Missouri Avenue in Atlantic City.

Contraflow Arterial Preferential Lane - Route 37 in Ocean County.

Exclusive Bypass Ramps - On the New Jersey Turnpike at congested toll plazas.

Contraflow Freeway Preferential Lane - On Interstate Route 78 and in the Meadowlands area.

Signal Preemption - On some of the main corridors into Philadelphia and in Bridgeton, Salem County.

Separate Roadway - In the Route 3 corridor.

The respondents who gave the remaining positive responses shown in Table A-5 did not have specific locations in mind for the application of these HOV preferential treatments.

APPENDIX D

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APPENDIX E

PRESENT AND PAST HOV PREFERENTIAL TREATMENTS AND THEIR BEFORE-AFTER DATA

This appendix first presents the specific locations, year implemented, and other general information for a specific preferential treatment in tabular form. This is followed by another table for that specific treatment which lists any before-after data that was collected. Four treatments (B, E, I, J) do not have this latter table because no impact data was collected for them. Also, for the other treatments, only those impacts which had data collected are listed in these before - after tables. Therefore many impacts which were expected to be affected (Table 1) are not listed.

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TREATMENT A: PREFERENTIAL TOLL CHARGES

LOCATION	A-1 Delaware River crossings between New Jersey and Pennsylvania	A-2 Hartford, Connecticut Bridges	A-3 Merritt Parkway, Connecticut
YEAR IMPLEMENTED	1972	1982	1982
LENGTH/SIZE	4 bridge crossings	3 bridge crossings	3 toll plazas
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	3 + carpools	3 + carpools	3 + carpools
HOURS OF OPERATION	24 hours	6 - 9 am 3 - 6 pm	6 - 9 am 3 - 6 pm
CURRENT STATUS	operational	operational	operational
COMMENTS	Will probably continue indefinitely.	Legislative action mandated treatments. One bridge has curb lane + hov's use that without stopping. One bridge dropped all tolls in 1985.	Legislative action mandated treatments. Toll plazas had a curb lane for official vehicles; carpools were allowed to use this lane. They had to slow to 5 mph but did not have to stop.

TREATMENT A: PREFERENTIAL TOLL CHARGES (cont'd)

LOCATION	A-4 Hudson River crossings between New York and New Jersey	A-5 Oakland Bay Bridge between Oakland and San Francisco, Cal	A-6 Golden Gate Bridge between San Francisco and Marin County, Cal.
YEAR IMPLEMENTED	1975	1970	1975
LENGTH/SIZE	2 tunnels and 2 bridges	1 bridge	1 bridge
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	3 + carpools	1970 - buses only 1971 - 3 + carpools	3 + carpools
HOURS OF OPERATION	24 hours	24 hours	6 - 9 am 3 - 6 pm
CURRENT STATUS	operational	operational	operational
COMMENTS		Implemented in conjuction with toll facility preferential lane (R-5).	Treatment was started during transit strike to encourage carpooling. Therefore, no before-after analysis performed.

TREATMENT A: PREFERENTIAL TOLL CHARGES (cont'd)

LOCATION	A-7 Coronado Bay Bridge in San Diego, California
YEAR IMPLEMENTED	1977
LENGTH/SIZE	1 bridge
NUMBER OF LANES	-
PRIORITY CUTOFF	3 + carpools
HOURS OF OPERATION	24 hours
CURRENT STATUS	operational
COMMENTS	

TREATMENT A - PREFERENTIAL TOLL CHARGES

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY	
A-1	No change.
INCREASE CARPOOLING & VANPOOLING	
A-1	No change.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
A-1	No reduction since there was no increase in high occupancy vehicles.
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
A-1	No reduction again because of no increase in high occupancy vehicles.
REDUCE AUTO USE ON THE ROADWAY	
A-1	No reduction.
REDUCE TRAVEL COSTS FOR HOV USERS	
A-1	Toll reduction from 75¢ to 40¢ for carpool and vanpool users. 10% discount for commuter buses off the $1.50 and $1.00 tolls.
A-2	Toll reduction from 35¢ to free for HOV users.
A-3	Toll reduction from 35¢ to free for HOV users.
A-4	Toll reduction from $1.50 to 50¢ for HOV users.
A-5	Toll reduction originally from 50¢ to free for HOV users. Toll is now 75¢.
A-6	Toll reduction originally from 75¢ to free for HOV users. Toll is now $1.00 (Mon-Thur) or $2.00(Fri.).
A-7	Toll reduction from $1.20 to 20¢ for carpool and vanpool users. Toll reduction from either $2.50, $3.00, or $3.50 to 20¢ for commuter buses.
INCREASE GOVERNMENT'S OPERATING COSTS	
A-3	No increase in operating costs.
A-4	No increase in operating costs.

TREATMENT A - PREFERENTIAL TOLL CHARGES (CONT'D)

TREATMENT NUMBER	IMPACT
COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENTS	
A-2	No court actions.
A-3	No court actions.
A-4	No court actions.

TREATMENT B: PREFERENTIAL FREEWAY CONGESTION PRICING

LOCATION

No present or past implementations of this treatment were found in the United States.

YEAR IMPLEMENTED

LENGTH/SIZE

NUMBER OF LANES

PRIORITY CUTOFF

HOURS OF OPERATION

CURRENT STATUS

COMMENTS

TREATMENT C: PREFERENTIAL PARKING COSTS

	C-1	C-2
LOCATION	Parking locations along Interstate Route 80, San Francisco, California	Parking location in downtown Miami, Florida
YEAR IMPLEMENTED	1981	1975
LENGTH/SIZE	60 lots	200 spaces
NUMBER OF LANES	-	-
PRIORITY CUTOFF	1981 - 3 + carpools 1982 - vanpools only	2 + carpools
HOURS OF OPERATION	24 hours	24 hours
CURRENT STATUS	operational	operation suspended in 1981
COMMENTS	Implemented in conjunction with preferential parking (E-4). The 3 + carpool cutoff was too hard to enforce, therefore cutoff changed to vanpools only.	Implemented in conjunction with preferential parking (E-5) and concurrent and contraflow preferential lanes (M-2, O-25). within two months of implementing, went from 35% to 100% occupancy. Treatment suspended because lot was in right-of-way of metrorail construction.

TREATMENT C - PREFERENTIAL PARKING COSTS

TREATMENT NUMBER	IMPACT
REDUCE TRAVEL COSTS FOR HOV USERS	
C-1	Fee reduced from $2.50-$7.00/day to free.
C-2	Fee reduced from $3.00/day to 50¢/day.

TREATMENT D: PARK-N-RIDE LOTS

LOCATION

YEAR IMPLEMENTED

Many Park-N-Ride lots exist today but hardly any data has been collected to determine their effectiveness. The following ten cases were collected in a 1983 New Jersey study entitled "An Analysis of the Response to New Jersey DOT's Survey of Statewide Park and Ride Development Programs," in which we surveyed all 50 States for before and after data for park-n-ride lots. As you will see, even the ten cases sited do not have much before-after data.

LENGTH/SIZE

NUMBER OF LANES

PRIORITY CUTOFF

HOURS OF OPERATION

CURRENT STATUS

COMMENTS

TREATMENT D: PARK AND RIDE LOTS (cont'd)

LOCATION	D-1 4 lots, Arkansas	D-2 1 lot, Oklahoma	D-3 5 lots, Pennsylvania
YEAR IMPLEMENTED			
LENGTH/SIZE			
NUMBER OF LANES			230 spaces
PRIORITY CUTOFF			
HOURS OF OPERATION			
CURRENT STATUS			148 spaces used.
COMMENTS		Decrease of 19,000 work trips per year.	Decrease of 421,000 vehicle miles traveled per year.

TREATMENT D: PARK AND RIDE LOTS (cont'd)

	D-4	D-5	D-6
LOCATION	13 lots, Kansas	6 lots, West Virginia	19 lots, California
YEAR IMPLEMENTED			
LENGTH/SIZE			
NUMBER OF LANES		257 spaces	
PRIORITY CUTOFF			
HOURS OF OPERATION			
CURRENT STATUS			
COMMENTS	Decrease of 1,256,500 VMT per year.	Decrease of 1,963,000 VMT per year.	In California, 180 park and ride lots exist with 7746 spaces of which 5539 are regularly used. Decrease of 2,007,000 VMT per year.

TREATMENT D: PARK AND RIDE LOTS (cont'd)

LOCATION	D-7 1 lot, California	D-8 9 lots, California	D-9 8 lots, California
YEAR IMPLEMENTED			
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF			
HOURS OF OPERATION			
CURRENT STATUS			
COMMENTS	Decrease of 2,495 VMT per year.	Decrease of 1,405,000 VMT per year.	Decrease of 3,444,000 VMT per year.

TREATMENT D: PARK AND RIDE LOTS (cont'd)

LOCATION	D-10 25 lots, Houston, Texas
YEAR IMPLEMENTED	
LENGTH/SIZE	
NUMBER OF LANES	
PRIORITY CUTOFF	
HOURS OF OPERATION	
CURRENT STATUS	
COMMENTS	

TREATMENT D - PARK-N-RIDE LOTS

TREATMENT NUMBER	IMPACT
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
D-10	Travel time increased 15 minutes per direction.
REDUCE TRAVEL COSTS FOR HOV USERS	
D-1	Road user benefits are $200,000 per year.
D-3	Road users save $71,570 per year based on VMT reduction.
D-4	Road users save $125,650 per year based on VMT reduction.
D-5	Road users save $145,860 per year based on VMT reduction.
D-6	Road users save $421,500 per year based on VMT reduction.
D-7	Road users save $524 per year based on VMT reduction.
D-8	Road users save $295,014 per year based on VMT reduction.
D-9	Road users save $723,250 per year based on VMT reduction.
D-10	An average commuter saved $68 per month.
REDUCE ENERGY USE	
D-2	Save 33,000 gallons per year.
D-3	Save 26,312 gallons per year based on VMT reduction.
D-4	Save 83,767 gallons per year based on VMT reduction.
D-5	Save 97,240 gallons per year based on VMT reduction.
INCREASE GOVERNMENT'S OPERATING COSTS	
D-5	Maintenance costs of $1000 per year for lots less than 20,000 square feet.

Treatment E: Preferential Parking

	E-1	E-2	E-3
LOCATION	Various lots in Philadelphia, Pennsylvania	Various lots in Minneapolis Minnesota	Various lots in Seattle, Washington
YEAR IMPLEMENTED	1976	1982	1973
LENGTH/SIZE		11 locations	200 space lot 100 spaces on street
NUMBER OF LANES			
PRIORITY CUTOFF	Vanpools	Vanpools	3 + carpools 2 + carpools in lot after 3 pm
HOURS OF OPERATION	24 hours	24 hours	lot - 24 hrs on street - 7-9am
CURRENT STATUS	operational	operational	operational
COMMENTS	Program implemented because of 1975 oil crisis.	Drop off spots were also implemented where vanpools could stop to pick up or drop-off passengers. Before, these spots were no parking and no standing locations.	On street spaces need car-pool permit.

TREATMENT E: PREFERENTIAL PARKING (cont'd)

	E-4	E-5
LOCATION	Parking locations along Interstate Route 80 in San Francisco, California	Parking location in downtown Miami, Florida
YEAR IMPLEMENTED	1981	1975
LENGTH/SIZE	60 lots - 400 reserved spaces - 4000 total spaces	200 spaces
NUMBER OF LANES	-	-
PRIORITY CUTOFF	1981 - 3 + carpools 1982 - vanpools only	2 + carpools
HOURS OF OPERATION	24 hours	24 hours
CURRENT STATUS	operational	operation suspended in 1981
COMMENTS	Implemented in conjunction with preferential parking costs (C_c-1). The 3+ carpool cutoff was too hard to enforce, therefore cutoff changed to vanpools only. 300 to 350 spaces are now being used. A separate parking area was set aside as a preferential maintenance area for the vanpools.	Implemented in conjunction with Preferential Parking costs (C-2) and Concurrent and Contraflow Arterial Preferential Lanes (M-2 & O-25). Within two months of implementing, went from 35% to 100% occupancy. Treatment sustpended because lot was in right-of-way of Metrorail construction.

TREATMENT F: EXCLUSIVE FREEWAY RAMP

	F-1	F-2	F-3
LOCATION	Braddock Ave. ramp to Parkway East, Pittsburgh, Pennsylvania	Ramp from Park-n-Ride lot to I-95, Miami, Florida	Ramp from Cherry and Columbia Sts. to I-5 Seattle, Washington
YEAR IMPLEMENTED	1971	1977	1970
LENGTH/SIZE	-	-	-
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	Buses only	2 + carpools	2 + carpools
HOURS OF OPERATION	6 - 9 am	7 - 9 am 4 - 6 pm	5:00 am - Noon - Southbound Noon - 5 am - Northbound
CURRENT STATUS	operation suspended in 1983	operational	operational
COMMENTS	Operation suspended when separate roadway reserved for HOV users (K-1) was implemented.	Ramp connects the Park-N-Ride lot to concurrent flow preferential lane (N-7).	Ramp comes off or on reversible median roadway reserved for HOV users (N-10).

TREATMENT F: EXCLUSIVE FREEWAY RAMP (cont'd)

LOCATION	F-4 South Capital Street Ramp, Washington, D. C.
YEAR IMPLEMENTED	1974
LENGTH/SIZE	-
NUMBER OF LANES	-
PRIORITY CUTOFF	Buses, Taxis, and Motorcycles
HOURS OF OPERATION	4-6 pm Southbound
CURRENT STATUS	operational
COMMENTS	

TREATMENT F - EXCLUSIVE FREEWAY RAMP

TREATMENT NUMBER	IMPACT
INCREASE CARPOOLING AND VANPOOLING	
F-2	21 additional bus passengers of 886 total passengers; 16 additional carpools of 73 total carpools.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
F-2	No real reduction since no large increase in carpools occured.
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
F-2	No reduction since no reduction in needs.
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
F-1	15 minute reduction.
F-2	In AM peak, autos save 1.7 minutes while buses save 0.8 minutes; in PM peak, autos save 2.8 minutes while buses save 4.0 minutes.
F-3	5-10 minute reduction.

TREATMENT G-H: TRANSIT MALL/AUTO RESTRICTED ZONE

	G-H-1	G-H-2	G-H-3
LOCATION	Portland Mall, Portland, Oregon	Washington St., Boston Massachusetts.	Main St., Pawtucket, Rhode Island
YEAR IMPLEMENTED	1977	1978	1980
LENGTH/SIZE	.8 mile on 5th St. and 6th = 1.6 mile	12 blocks on 6 different streets	2 blocks
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	Buses only	Buses only	1980 - ARZ 1984 - Transit Mall
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
COMMENTS	Buses run southbound on 5th St. and northbound on 6th St. Buses travel time reduced from 3.67 to 2.5 minutes while bus passengers also saved 45 seconds in walking, waiting and transferring.	Deliveries allowed from 6 pm to 11 am.	

TREATMENT G-H: TRANSIT MALL/AUTO RESTIRCTED ZONE (cont'd)

	G-H-4	G-H-5	G-H-6
LOCATION	49th & 50th Streets, New York, New York	Fulton St., New York, New YOrk	Chestnut St., Philadelphia, Pennsylvania
YEAR IMPLEMENTED	1979	1980	1975
LENGTH/SIZE	.88 mile	.3 mile	1.5 miles
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	Buses, Taxis, and local truck deliveries	Buses only	Buses only
HOURS OF OPERATION	11 am to 4 pm	24 hours	6 am to 7 pm
CURRENT STATUS	operational	operational	operational
COMMENTS	Buses travel time reduced from 18 to 11 minutes. Taxis travel time reduced from 13½ to 9½ minutes.		Due to it not being policed on a regular basis, municipal vehicles and delivery trucks often block the lanes.

TREATMENT G-H: TRANSIT MALL/AUTO RESTRICTED ZONE (cont'd)

	G-H-7	G-H-8	G-H-9
LOCATION	Kennedy Plaza, Westminister Street, Providence, Rhode Island	10th Street NW, Washington, D. C.	State Street, Madison, Wisconsin
YEAR IMPLEMENTED	1985	1971	1977
LENGTH/SIZE	2 blocks	.1 mile	6 blocks
NUMBER OF LANES			
PRIORITY CUTOFF	Buses only	Buses, Taxis, and Motocycles	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
COMMENTS		Will be suspended soon due to the completion of the new subway. Only 20 buses now use the mall during the peak hour.	

TREATMENT G-H: TRANSIT MALL/AUTO RESTRICTED ZONE (cont'd)

	G-H-10	G-H-11	G-H-12
LOCATION	Nicollet Mall, Minneapolis, Minnesota	Hitt & Conley Streets, Columbia, Missouri	16th Street, Denver Colorado
YEAR IMPLEMENTED	1969	1974	1982
LENGTH/SIZE	1 mile	.65 mile	1 mile
NUMBER OF LANES			
PRIORITY CUTOFF	Buses and Taxis	Buses and Emergency Vehicles	Mall Buses only
HOURS OF OPERATION	24 hours	8:15 am - 3:45 pm	24 hours
CURRENT STATUS	operational	operational	operational
COMMENTS		Treatment implemented because of large pedestrian volume on University of Missouri Campus.	Free fare mall buses shuttle between the ends of the mall, where major bus Stations are located. Mall buses carry approximately 40,000 passengers/day.

TREATMENT G-H-: TRANSIT MALL/AUTO RESTRICTED ZONE (cont'd)

LOCATION	G-H-13 63rd & Halstead Streets, Chicago, Illinois	G-H-14 State Street, Chicago, Illinois	G-H-15 State Street Staging Area, Chicago, Illinois
YEAR IMPLEMENTED	1959	1977	1977
LENGTH/SIZE	.4 mile	.75 mile	.1 mile
NUMBER OF LANES	-	-	2 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	4-6 pm
CURRENT STATUS	operational	operational	operational
COMMENTS		State Street is a major shopping street and was 6 lanes wide.	Used as recovery area for buses to get timed and synchronized to start their trip through the State Street Mall(G-H-14). Eight lane street, 3 lanes in one direction closed to implement staging area. One lane open to general traffic in one direction, four lanes open to general traffic in other direction.

TREATMENT G-H-: TRANSIT MALL/AUTO RESTRICTED ZONE (cont'd)

	G-H 16	G-H 17	G-H-18
LOCATION	Mid-America Mall (Main St.), Memphis, Tennessee	K Street Mall, Sacramento, California	Woodard Mall, Detroit, Michigan
YEAR IMPLEMENTED	1973	1970	1978
LENGTH/SIZE	.9 mile	11 blocks	5 blocks - 1/4 mile
NUMBER OF LANES	-	-	-
PRIORITY CUTOFF	No vehicular traffic	Trams	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operation suspended in 1982
COMMENTS	Major commercial area. Inconvenient to transit user because they must walk one block to parallel street to catch a bus. Transit service may be added to the area in the near future.	Streetcar-like trams run on 12 minute headways between 12 noon and 4 pm. Light rail is also being constructed in mall.	Area had mostly wholesale commercial activity was not conducive to transit mall/ pedestrian area. Therefore was reopened to general traffic.

TREATMENT G-H - TRANSIT MALL/AUTO RESTRICTED ZONE

TREATMENT NUMBER	IMPACT
INCREASE BUS TRANSIT USE	
G-H-1	In 1977 - 30% of the work trips in the mall area were by bus. In 1980 - 70% of the work trips in the mall area were by bus.
G-H-2	6000 of 113,000 auto trips/day shifted to transit. Bus usage went from 26% to 30% of total traffic.
REDUCE AUTO USE ON THE ROADWAY	
G-H-1	

	Before	After	% Change
East-West	62,962 veh-mi	64,883 veh-mi	2.9
North-South	98,217 veh-mi	88,778 veh-mi	-10.6
Total	161,179 veh-mi	153,611 veh-mi	-4.9
Bus	3,179 veh-mi	2,906 veh-mi	-9.4

G-H-2	Auto trips were reduced from 113,000/day to 107,000/day.
IMPROVE AIR QUALITY	
G-H-1	Emissions are approximately the same but are now separated from predestrian traffic.
G-H-2	Carbon Monoxide emissions lowered 67% in mall area (15.2 to 5.0 Tons/day) and 41% in area adjacent to mall area. Nitrogen oxides have also been reduced.
IMPROVE NOISE QUALITY	
G-H-1	On the mall, the noise level increased during the day, the peak period, and at night. Off the mall, there was no change.
G-H-2	Noise level was noticably reduced.
IMPROVE COMFORT AND CONVENIENCE FOR HOV'S	
G-H-1	From survey, approximately 75% of employees, transit riders, and pedestrians agree that the mall is a nice place to walk.
G-H-2	Mall allows a 4 to 6 minute saving in walking time.
G-H-3	From shopper survey, approximately 85% agree that the mall is convenient to get to, while

TREATMENT G-H - TRANSIT MALL/AUTO RESTRICTED ZONE (CONT'D)

TREATMENT NUMBER	IMPACT
	from the business survey, approximately 55% agree that the mall is safer and more pleasant for shoppers.
INCREASE PEDESTRIAN AND BICYCLE TRAFFIC	
G-H-2	11% increase in pedestrian traffic during the day; no change at night.
G-H-3	From business survey, no increase in pedestrian traffic.
ENHANCE LOCAL COMMERCIAL ACCESS AND ACTIVITY	
G-H-2	Sales have increased, therefore halting the downward trend.
G-H-3	From business survey, approximately 78% say no sales increase.
MINIMIZE OPERATIONAL COSTS FOR ROADWAY ADMINISTRATION	
G-H-1	Additional maintenance costs is approximately $200,000/yr.
INCREASE NON-HOV OPERATIONAL COSTS	
G-H-1	Additional non-HOV cost is approximately $410,000/yr.
INCREASE TRANSIT'S OPERATING COSTS	
G-H-1	Transit savings of $1,604 million/year.
G-H-2	Expanded service which cost $500,000/year. This service was cut in 1980 because of the cost but was reinstated in 1981.
INCREASE PARKING NEEDS	
G-H-1	The city built two parking garages to take the place of the 308 parking spaces on the Mall streets that became inaccessible.
G-H-2	The 600 spaces which became inaccessible were replaced by the same number in private lots.
G-H-3	The city built a free parking garage along the mall and from the business survey, approximately 62% agreed that parking is adequate.

TREATMENT G-H - TRANSIT MALL/AUTO RESTRICTED ZONE (CONT'D)

TREATMENT NUMBER	IMPACT
DECREASE AIR QUALITY INITIALLY	
G-H-1	No change in air quality. The additional bus exhaust fumes equal out the reduction in auto emissons.
DECREASE NOISE QUALITY INITIALLY	
G-H-1	An increase in bus noise negates the reduction in background noise of the steady traffic.
DIVERSION TO OTHER ROUTES	
G-H-2	1000 auto trips/day diverted to outside the study area.
G-H-3	From business survey, 53% agree that circulatory route works well and diversion not needed.
HAMPER COMMERCIAL DELIVERIES	
G-H-1	Deliveries now on side streets, but none more than 100 feet from the store front. Large purchases may be hampered by the mall.
G-H-2	Deliveries allowed between 6pm and 11am. No delivery problems encountered.
G-H-3	From business survey, 68% agree that no delivery problems exist.

TREATMENT I: REDUCED PARKING WITH PRIORITY

LOCATION	I-1 Parking freeze, Boston, Massachusetts
YEAR IMPLEMENTED	1970's
LENGTH/SIZE	Private lots
NUMBER OF LANES	
PRIORITY CUTOFF	Vanpools
HOURS OF OPERATION	24 hours
CURRENT STATUS	operational
COMMENTS	Prudential, John Hancock, and United Brands reserved parking spaces for vanpools.

TREATMENT J: TURNING MOVEMENT RESTRICTIONS

LOCATION

No turning movement restrictions have been done exclusive of another HOV treatment. The effects of this treatment would be hard to separate from the effect of the other treatment. Therefore, below is a list of projects where turning restrictions were implemented.

YEAR IMPLEMENTED

LENGTH/SIZE

O-8-U.S. 1 - South Dixie Highway, Miami, Florida
O-59 Barbour Blvd., Portland, Oregon
M-3 Market St. Harrisburg, Pennsylvania
O-96 4th St., Nashville, Tennessee
O-76 Main St., Houston, Texas

NUMBER OF LANES

Any before-after data would be shown under these headings.

PRIORITY CUTOFF

HOURS OF OPERATION

CURRENT STATUS

COMMENTS

TREATMENT K: SEPARATE ROADWAY

	K-1	K-2	K-3
LOCATION	East Pathway, Pittsburgh, PA	South Pathway, Pittsubrgh, PA	Shirley Highway (I-95-395), Virginia
YEAR IMPLEMENTED	1983	1977	1969
LENGTH/SIZE	6.8 miles	4.3 miles	12 miles
NUMBER OF LANES	2 lanes	2 lanes	2 lanes
PRIORITY CUTOFF	Buses only	Buses only	1969 - Buses only 1973 - 4 + carpools
HOURS OF OPERATION	24 hours	24 hours	1969 - 24 hours 1985 - 6-9 am 3:30 - 6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS	None	None	less than 3%
COMMENTS	The roadway planning included participation and acceptance by the community and no one had worse service than before the separate roadway.		3 general lanes in each direction, 2 reversible priority lanes in median.

TREATMENT K: SEPARATE ROADWAY (cont'd)

	K-4 I-66, Virginia	K-5 San Bernadino Freeway, Los Angeles, California	K-6 East Side Tunnel, Providence, Rhode Island
YEAR IMPLEMENTED	1982	1973	1914
LENGTH/SIZE	12 miles	11 miles	.8 miles
NUMBER OF LANES	2 lanes in each directions	2 lanes	2 lanes
PRIORITY CUTOFF	1982-4 + carpools, emergency vehicles, & airport traffic 1984 - 3 + carpools	1973 - Buses only 1976-77 - 3 + carpools	Buses only & emergency vehicles
HOURS OF OPERATION	1982-6:30-9:00 pm EB 3:30-6:30 pm WB 1984-7 - 9 am EB 4 - 6 pm WB	Buses - 24 hours Carpools - 6-10 am 3-7 pm	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS	19% EB 25% WB	buses - none carpools - less than 10%	none
COMMENTS			Was started as cable car right-of-way through College Hill which is very steep. Has been converted to busway.

TREATMENT K: SEPARATE ROADWAY (cont'd)

	K-7 Alamo Plaza San Antonio, Texas	K-8 I-45N, Houston Texas	K-9 Katy Freeway (I-10), Houston, Texas
LOCATION			
YEAR IMPLEMENTED	1979	1984	1984
LENGTH/SIZE	.2 miles	9.6 miles	6.2 miles
NUMBER OF LANES	1 lane	1 lane - 16 ft being widened to 20 ft.	
PRIORITY CUTOFF	Buses only	Buses and 8 + vanpools	Oct. 84 - vanpools Apr. 85 - 4 + carpools Nov. 85 - 3 + carpools
HOURS OF OPERATION	24 hours	6 - 8:45 am SB 4 - 6:30 pm NB	5:45 - 9:15 am EB 3:30 - 7:00 pm WB
CURRENT STATUS	operational	operational	operational
VIOLATIONS	very low		
COMMENTS	Not many buses use roadway, therefore plan to change separate roadway to pedestrian mall and put a contraflow bus lane on Alamo Plaza general lanes.	Replaced the contraflow lane (L-2) and extension will replace concurrent flow lane (N-9) in the near future.	

TREATMENT K: SEPARATE ROADWAY (cont'd)

	K-10 Eddy Street, Providence, Rhode Island	K-11 New York Avenue, N. E., Washington, D.C.	K-12 Hodiamont Right-of-Way, St. Louis, Missouri
LOCATION			
YEAR IMPLEMENTED	1965	1974	1966
LENGTH/SIZE	1 block	.5 mile	3.5 miles
NUMBER OF LANES	1 lane		2 lanes
PRIORITY CUTOFF	Buses	Buses, Taxis, Motorcycles, & Right Turns	Buses only
HOURS OF OPERATION	7 am - 6 pm	WB 7 - 9 am EB 4 - 6 pm	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS			Was a street car right-of-way. Tracks were removed for bus use.

TREATMENT K: SEPARATE ROADWAY (cont'd)

	K-13	K-14	K-15
LOCATION	Canal Street at Union Street, Chicago, Illinois	Canal Street, New Orleans, Louisiana	Cambridge Bus Terminal, Boston, Massachusetts
YEAR IMPLEMENTED	1984	1962	1965
LENGTH/SIZE	.1 mile	1.5 mile	.5 mile
NUMBER OF LANES	4 lanes	2 lanes	2 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS		Used by street car, then repaved as 24 foot roadway for buses only.	Buses use exclusive tunnel. In middle they drop off passengers for Harvard Square MBTA station. These passengers then take subway into downtown.

TREATMENT K - SEPARATE ROADWAY

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY OF THE ROADWAY	
K-1	Bus trips increased 5000 to 10,000 per day. With a 1.2 passengers per vehicle occupancy, 4150 to 8300 vehicle trips were saved.
K-2	Bus trips increased 1250 per day. With a 1.2 passengers per vehicle occupancy, 1050 vehicle trips were saved.
K-3	Approximately 7600 vehicles eliminated during AM and PM peak periods (7 hrs.).
K-4	During peak hour, 1300 vehicles carry 5330 people. To carry this many people with an average occupancy rate of 1.2 persons/vehicle, 4440 vehicles would be needed which is 11% over capacity.
K-5	During bus only operation, 2500 auto trips were eliminated while during bus and 3+ carpool operation, an additional 2500 auto trips were eliminated.
K-8	The general lanes carried 7200 passengers in 6000 vehicles (using avg. occ. of 1.2 persons/veh,) while the separate roadway carried 7100 passengers in approximately 500 vehicles.
K-9	Before implementation there were 271 buses and vanpools carrying 5046 passengers. After implementation there were 370 buses and vanpools carrying 6182 passengers. Using an average occupancy rate of 1.2 persons/vehicle, the additional 1136 passengers would need 950 vehicles. Thus 850 vehicle trips were saved.
INCREASE BUS TRANSIT USE	
K-1	Bus riders increased 5000 to 10,000 per day. Total riders now 27,000 passenger per day.
K-2	Bus riders increased 1250 per day. Total ridership now 19,000 passengers per day.
K-3	In 1969, express buses using I-95 during the AM peak carried 4200 of the 14,000 passengers using buses in the corridor. In 1974, these express buses carried 16,100 of the 25,000 passengers using buses in the corridor.
K-5	During first 29 months bus trips went from 1000 to 14,500 per day.

TREATMENT K - SEPARATE ROADWAY (CONT'D)

TREATMENT NUMBER	IMPACT
INCREASE BUS TRANSIT RELIABILITY	
K-3	Buses within six minutes of scheduled time before implementation was 33% while afterwards was 92%.
K-1, 2, & 5	No statistics but bus reliability much improved.
INCREASE CARPOOLING AND VANPOOLING	
K-5	Carpools increased from 600 to 1400 vehicles at an average occupancy of 3.3 persons/vehicle. Therefore 2640 persons began to carpool.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
K-1	4150 to 8300 vehicle trips per day eliminated. If one quarter of these were eliminated during the peak hour, it is estimated that one half to a whole additional traffic lane would be needed today to handle this traffic.
K-2	1050 vehicle trips per day eliminated. If one quarter of these were eliminated during the peak hour, it is estimated that it would take an additional year or two for the roadway to reach capacity.
K-3	1100 vehicle trips during the peak hour were eliminated. Because of the eliminated trips, it is estimated that it would take an additional seven or eight years for the roadway to reach capacity.
K-4	4400 vehicle trips during the peak hour were eliminated. This is 11% over the capacity of the present roadway.
K-5	5000 vehicle trips per day eliminated. If one quarter of these were eliminated during the peak hour, it is estimated that it would take an additional seven or eight years for the roadway to reach capacity.
K-8	The preferential lane carries the same number of persons as the three general lanes. Thus without the occupancy increase, it is estimated that two additional lanes would be required today to handle this traffic.
K-9	850 vehicle trips per day eliminated. If one quarter of these were eliminated during the peak hour, it is

TREATMENT K - SEPARATE ROADWAY (CONT'D)

TREATMENT NUMBER	IMPACT
	estimated that it would take an additional year or two for the roadway to reach capacity.
REDUCE CONGESTION ON THE ROADWAY	
K-1	Nine minutes saved.
K-2	Nine minutes saved.
K-3	10-15 minutes saved, 30 minutes during reconstruction.
K-4	12-15 minutes (25 to 15) saved compared to parallel routes.
K-5	Buses saved 11-16 minutes (30 to 14) in the morning peak and 1 to 6 minutes (20 to 14) in the evening peak. Carpools saved approximately two minutes more.
K-6	2 to 3 minutes saved.
K-7	2 minutes saved.
K-8	27 minutes (47 to 20) saved.
K-9	20 minutes (45 to 25) saved by general traffic, while 33 to 39 minutes (45 to 6) saved by HOVs.
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
	(Note - assume a lane cost of $500,000/mile in today's dollars.)
K-1	Save approximately $1.7 to $3.4 million.
K-2	Save approximately $110,000 to $220,000.
K-3	Save approximately $2.3 million.
K-4	Save approximately $6 million.
K-5	Save approximately $2 million.
K-8	Save approximately $9.6 million.
K-9	Save approximately $155,000 to $310,000.
REDUCE AUTO USE ON THE ROADWAY	
	Same as impact 1.

TREATMENT K - SEPARATE ROADWAY (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
	Same as impact 7.
REDUCE ENERGY USE	
K-3	Saved 7 million gallons of gas/year, a 23% reduction.
K-4	Saved 668,000 gallons of gas/year.
K-5	Saved 1.6 million gallons of gas/year, a 7% reduction during bus only operations. Saved 2.3 million gallons of gas/year, a 10% reduction during carpool operation.
IMPROVE AIR QUALITY	
K-3	From 1971 to 1974, CO was reduced by 5500 tons, HC was reduced by 700 tons, and NO was reduced by 400 tons, a reduction of 21%.
K-4	6% reduction in emissions.
K-5	During bus only operation, CO was reduced by 4.8 tons/day (-13%), AC was reduced by .9 tons/day (-13%) and NO was reduced by .6 tons/day (-10%). During carpool operation, CO was reduced by 5.3 tons/day (-20%), HC was reduced by 1.2 tons/day (-20%) and NO was reduced by .8 tons/day (-17%).
INCREASE TRANSIT'S OPERATING COSTS	
K-1 & 2	Service added and routes restructured but no specific dollar amounts determined.
K-3	Transit costs were $6.7 million while transit revenues were $6.55 million. The deficit of only $.01/bus-mile shows that the service almost paid for itself.
NEGATIVE MEDIA COVERAGE	
K-1,2, 3&5	Good to excellent media coverage.
K-4	Users liked it but others gave many negative responses.
COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENTS	
K-1,2, & 3	No court actions initiated.

TREATMENT K - SEPARATE ROADWAY (CONT'D)

TREATMENT NUMBER	IMPACT
K-4	Congressional action lowered the occupancy requirement and shortened the hours of operation.

TREATMENT L: CONTRAFLOW FREEWAY PREFERENTIAL LANE

	L-1	L-2	L-3
LOCATION	Southeast Expressway, Boston Massachusetts	I-45N, Houston Texas	U. S. 101, San Francisco, California
YEAR IMPLEMENTED	1971	1979	1972
LENGTH/SIZE	8.5 miles	9.6 miles	4 miles
NUMBER OF LANES	1 of 4	1 of 3	1 of 5
PRIORITY CUTOFF	Bus only	Buses and 8 + vanpools	Buses only
HOURS OF OPERATION	NB - 7 - 9:30 am SB - 4 - 7 pm	SB - 6 - 8:30 am NB - 4 - 6:30 pm	NB - 4 - 6 pm
CURRENT STATUS	SB operation suspended in 1971, NB operation suspended in 1976	operation suspended in 1984	operational
VIOLATIONS		10 - 15 violations per month	no violation problems
COMMENTS	Southbound closed after 1971 demo because of small benefit, Northbound closed in 1976 due to operating costs being too high. Lane was only operated during the summer because of safety problems when setting up and removing cones during darkness.	Operation was replaced by a separate roadway (K-8).	Connects with Concurrent Flow Freeway lane (N-2).

TREATMENT L: CONTRAFLOW FREEWAY PREFERENTIAL LANE (cont'd)

LOCATION	L-4 Lake Shore Drive, Chicago, Illinois
YEAR IMPLEMENTED	1960
LENGTH/SIZE	.6 miles
NUMBER OF LANES	1 of 5 or 6
PRIORITY CUTOFF	Buses and Taxis
HOURS OF OPERATION	3 hours before Chicago Bears' football games
CURRENT STATUS	operational 8 to 11 time a year
VIOLATIONS	
COMMENTS	operation allows buses and taxis to jump queue before football games.

TREATMENT L - CONTRAFLOW FREEWAY PREFERENTIAL LANES

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY OF THE ROADWAY	
L-1	Before, there were 5054 vehicles including buses carrying 8898 people for an average occupancy of 1.76. After, there were 5068 vehicles including buses carrying 9058 people for an average occupancy of 1.79.
L-2	During the first week of operation 57 buses carried 804 passengers while 164 vanpools carried 1539 passengers. After one year, 125 buses carried 5140 passengers and 412 vanpools carried 3584 passengers. This is an increase of 6381 passengers and 316 vehicles.
L-3	Very small increase in bus users.
INCREASE BUS TRANSIT USE	
L-1	Before, 57 buses carried 2152 passengers, three months after 65 buses carried 2454 passengers.
L-2	During the first week 57 buses carried 804 passengers. One year later, 125 buses carried 5140 passengers.
L-3	Now 150 buses carry 6000 passengers; a very small increase in bus patronage.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
L-1	Approximately 100 vehicle trips were eliminated. Because of these eliminated trips, it is estimated that it would take an additional year for the roadway to reach capacity.
L-2	5000 vehicle trips eliminated during both peak periods. If one quarter of these were eliminated during the peak hour, it is estimated, that it would take an additional seven or eight years for the roadway to reach capacity.
L-3	Since very small increase in occupancy, no reduction in need.
REDUCE CONGESTION ON THE ROADWAY	
L-1	5000 general lane vehicles with an occupancy of 1.32 passengers per vehicle save 4.5 minutes while 65 buses with 2454 passengers save 14.5 minutes.

TREATMENT L - CONTRAFLOW FREEWAY PREFERENTIAL LANES (CONT'D)

TREATMENT NUMBER	IMPACT
	REDUCE FUTURE CAPITAL COSTS OF NEW CONSTRUCTION
	(Note - assume a lane costs $500,000/mile in today's dollar.)
L-1	Save approximately $210,000.
L-2	Save approximately 1.7 to 1.9 million.
L-3	No real savings because no change in occupancy.
	REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL
	Same as Impact 7.
	REDUCE TRAVEL COSTS FOR HOV USERS
L-1	Using $3/hour for 2,454 bus passengers and 14 minute time savings, $1718 per day are saved during the morning peak.
L-2	Operating costs saved due to modal shift was $1,204 per day. Time savings during the off-peak were worth $760/per day and during the peak were miniscule. The cost to diverted traffic was $485 per day, for a final savings of $1575 per day or $393,859 per year.
	REDUCE ENERGY USE
L-2	Saving of 671,300 gallons per year.
	IMPROVE AIR QUALITY
L-2	CO reduced by 148 million tons per year, HC reduced by 18 million tons per year and NOx reduced by 42 million tons per year.
	INCREASE GOVERNMENT'S OPERATING COSTS
L-1	Daily Operating Costs of $542.

TREATMENT L - CONTRAFLOW FREEWAY PREFERENTIAL LANES (CONT'D)

TREATMENT NUMBER	IMPACT
L-2	Daily Operating Costs of $2600.
L-3	Monthly Operating Costs of $5000.
INCREASE ACCIDENTS INITIALLY	
L-1	No Accidents Reported.
L-2	During peak there was no effect, while during off-peak, increased significantly from 99 to 128 accidents.
L-3	No safety problems reported.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE

	M-1	M-2	M-3
LOCATION	Kalanianaole Highway Honolulu, Hawaii	U. S. 1 - South Dixie Highway, Miami, Florida	Second Avenue, New York, New York
YEAR IMPLEMENTED	1973	1974	1978
LENGTH/SIZE	1.9 miles	5.5 miles	.09 mile
NUMBER OF LANES	1 of 3 lanes	1 of 4 lanes	1 of 6 lanes
PRIORITY CUTOFF	1974 - Buses only 1975 - 3 + carpools	Buses only	Buses only
HOURS OF OPERATION	WB - 6-8 am	7-9 am 4-6 pm	4-6:45 pm
CURRENT STATUS	operational	operation suspended in 1976	operational
VIOLATIONS	10%		
COMMENTS	Connected to concurrent flow arterial lane (0-22) Most data shown is during bus lane to after car-pool lane. Construction will make six lane divided roadway and occupancy limit will be raised to 4+.	Results are combination of this project and concurrent flow arterial lane (0.25). Operation suspended due to high operating cost.	Seems to be self-enforcing.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	M-4	M-5	M-6
LOCATION	Adams Street, Chicago, Illinois	Jackson Boulevard, Chicago, Illinois	Madison Street Chicago, Illinois
YEAR IMPLEMENTED	1980	1980	1981
LENGTH/SIZE	1 mile	1 mile	1 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operation has been changed to concurrent flow preferential lane
VIOLATIONS			
COMMENTS	Will change to concurrent flow soon because of safety problems.	Same as M-4	Change made due to safety problems.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	M-7	M-8	M-9
LOCATION	Washington Street, Chicago, Illinois	2nd and Marquette Avenue, Minneapolis, Minnesota	College Street, Indianapolis, Indiana
YEAR IMPLEMENTED	1981	1978	1969
LENGTH/SIZE	1 mile	1 mile	2.7 miles
NUMBER OF LANES	1 of 3 lanes	1 of 4 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses only	Buses and commercial vehicles	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation has been changed to concurrent flow preferential lane	operational	operational
VIOLATIONS			
COMMENTS	Change made due to safety problems.	Raised median divider separated lane from general use lanes.	

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	M-10	M-11	M-12
LOCATION	University Avenue Madison, Wisconsin	Jefferson Street, Toledo, Ohio	Kalakaua Boulevard, Honolulu, Hawaii
YEAR IMPLEMENTED	1965	1981	1971
LENGTH/SIZE	1 mile	12 blocks - loop	.8 mile
NUMBER OF LANES	1 of 5 lanes	1 of 4 lanes	1 of 6 lanes
PRIORITY CUTOFF	Buses and bicycles	Buses and right turns	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation suspended in 1979	operational	operation suspended in 1984
VIOLATIONS		started high but dropped off	
COMMENTS	Because of heavy bicycle traffic buses were eliminated from the lane and were reassigned to a parallel street. Raised median divider separated lane from general use lane.	Very stable operation.	Operation suspended because of serious accidents with pedestrians.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	M-13 5th Street, Seattle, Washington	M-14 Market Street, Harrisburg, Pennsylvania	M-15 Hennepin Avenue, Minneapolis, Minnesota
YEAR IMPLEMENTED	1970	1957	1980
LENGTH/SIZE	3 blocks	3 blocks	1 mile
NUMBER OF LANES	1 of 4 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses and commercial vehicles
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Opened to provide access to I-5 priority ramp.	Will be suspended in the future due to redevelopment plan.	

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	M-16	M-17	M-18
LOCATION	Fifth Avenue - Liberty-William Penn, Pittsburgh, Pennsylvania	Fifth Avenue - Jumonville-Belfield, Pittsburgh, Pennsylvania	Fort Duquesne Boulevard, Pittsburgh, Pennsylvania
YEAR IMPLEMENTED	1979	1980	1960
LENGTH/SIZE	.3 mile	1.6 mile	.1 mile
NUMBER OF LANES	1 of 3 lanes	1 of 4 to 6 lanes	1 of 7 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS			

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	M-19 Penn Avenue, Pittsburgh, Pennsylvania	M-20 Canal Street at Union Station, Chicago, Illinois	M-21 Canal Street at Northwest Station, Chicago, Illinois
YEAR IMPLEMENTED	1982	1960	1960
LENGTH/SIZE	.5 mile	.1 mile	.1 mile
NUMBER OF LANES	1 of 3 lanes	1 of 5 lanes	1 of 5 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation suspended in 1984	operation suspended in 1983	operational
VIOLATIONS			
COMMENTS	Operation suspended due to numerous construction projects in the area including the new subway.	It was implemented to help buses leave the train station. Operation suspended when major reconstruction at Union Station was completed.	It was implemented to help buses leave the train station.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	M-22	M-23	M-24
LOCATION	Canal Street at Harrison to Polk, Chicago, Illinois	East 1st Street, Austin, Texas	16th Street SW, Seattle, Washington
YEAR IMPLEMENTED	1960	1978	1978
LENGTH/SIZE	.1 mile	.4 mile	.75 mile
NUMBER OF LANES	1 of 5 lanes	1 of 4 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses only	Buses only	3 + carpools
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation suspended in 1983	operational	operational
VIOLATIONS			
COMMENTS	It was implemented to help buses leave the light industrial park. Operation suspended due to very light bus use.		Was opened due to a bridge being damaged and closed. When bridge is repaired the operation of the lane will be suspended.

TREATMENT M: CONTRAFLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	M-25 Wood and Smithfield Streets, Pittsburgh, Pennsylvania	M-26 Smithfield Street, Pittsburgh, Pennsylvania
YEAR IMPLEMENTED	1983	1984
LENGTH/SIZE	.65 miles	.1 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Bus only	Buses only
HOURS OF OPERATION	24 hours	24 hours
CURRENT STATUS	operational	operational
VIOLATIONS		
COMMENTS		

TREATMENT M - CONTRAFLOW ARTERIAL PREFERENTIAL LANE

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY OF THE ROADWAY	
M-1	In 1974, 3850 vehicles had an occupancy of 1.70 while in 1977, 4730 vehicles had an occupancy of 1.84.
M-2	2400 more passengers were in 350 less vehicles.
INCREASE BUS TRANSIT USE	
M-1	Although the number of passengers stayed the same, the percentage of bus trips went from 16 percent in 1974 to 11 percent in 1977.
M-2	Number of buses increased from 10 to 84 while passengers increased from 400 to 2000.
M-11	No Significant change.
INCREASED BUS TRANSIT RELIABILITY	
M-4 thru 7	Although no statisical data, assumed to be much improved.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
M-1	Approximately 400 vehicle trips per hour were eliminated due to increase in occupancy. Because of the eliminated trips, it is estimated that it would take approximately four additional years for roadway to reach capacity.
M-2	Using average occupancy of 1.2 persons per vehicle, approximately 2000 vehicle trips per day were eliminated. If 800 of these were eliminated during the peak hour, it is estimated that it could take approximately five additional years for the roadway to reach capacity.
REDUCE CONGESTION ON THE ROADWAY	
M-1	Travel time before was 10.2 minutes, while after implementation the general use lane's travel time was 9.8 minutes and the priority lane's travel time was 6.9 minutes.
M-2	After implementation the general use lanes' travel time was 20 minutes, while the priority lane's travel time was 9 minutes.
M-3	A savings of 10 minutes reported.

TREATMENT M - CONTRAFLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
M-4 - M-7	After implementation the general lanes' travel time was 10.25 minutes, while the priority lane's travel time was 8 minutes.
M-10	A savings up to 6 minutes reported.
M-11	After implementation the general lanes' travel time was 12 minutes, while the priority lane's travel time was 8 to 9 minutes during the peak and 7 minutes during the off-peak.

REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION

(Note - assume a lane costs $500,000/mile in today's dollars.)

M-1	Save approximately $190,000.
M-2	Save approximately $680,000.

REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL

Same as Impact 7.

REDUCE TRAVEL COSTS FOR HOV USERS

M-1	Operating costs reduced $225,000 per year because of reduction in vehicles miles.
M-2	Operating costs reduced $3600 per day.

INCREASE TRANSIT'S OPERATING COSTS

M-4 - M-7	Because of time savings and better reliability, five buses where removed from service, saving the transit company $400,000/year.

INCREASE GOVERNMENT'S OPERATING COSTS

M-1	Operating Costs were $37,200 per year.
M-2	Operating Costs were $30,000 per month.
M-8	Operating costs were $100 per month.

INCREASE ACCIDENTS INITIALLY

M-1	Rates per million vehicle miles were 2.03 before implementation, 2.06 during bus only operation , and 2.23 during 3 + carpool operation.

TREATMENT M - CONTRAFLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
M-2	For nine months, 148 accidents occurred before implementation, while 245 accidents occurred after implementation.
M-4 & M-5	During 24 months, before implementation had 84.3 accidents per month, while during 18 months, after implementation had 86.6 accidents per month.
M-6 & M-7	During 24 months, before implementation had 93.5 accidents per month, while during 18 months, after implementation had 83.5 accidents per month.
M-9	Total accidents one year before implementation were 186, while one, two, and three years after implementation the total accidents were 174, 105, and 152.

COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENT

M-1 & M-11	No actions initiated.

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE

	N-1	N-2	N-3
LOCATION	Garden State Parkway, Middlesex County, New Jersey	Rt. 101, Marin California	Moanalua Freeway, Honolulu, Hawaii
YEAR IMPLEMENTED	1980	1974	1974
LENGTH/SIZE	12 miles	3.8 miles	EB - 2.6 miles WB - 1.3 miles
NUMBER OF LANES	1 of 4 lanes	1 of 4 lanes	1 of 3 lanes
PRIORITY CUTOFF	1980 3 + carpools 1981 2 + carpools	3 + carpools	3 + carpools
HOURS OF OPERATION	Both directions 7-9 am 3-6 pm	SB - 6-9 am NB - 4-7 pm	24 hours
CURRENT STATUS	operation suspended in 1982	operational	operational Eastbound, suspended in 1977 Westbound
VIOLATIONS	3 + - 9-50% 2 + - 6-18%	am - 5% pm - 15-25%	peak - 2% offpeak - 8-12%
COMMENTS	Operation suspended due to low utilization of lane.	Operates in conjunction with Contraflow Freeway Lane (L-3).	Westbound operation suspended because need for it was not shown.

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (cont'd)

	N-4	N-5	N-6
LOCATION	Brooklyn-Queens Expressway, New York, New York	I-280, San Francisco, California	I-91, Los Angeles, California.
YEAR IMPLEMENTED	1976	1975	1985
LENGTH/SIZE	1.2 miles	2 miles	8 miles
NUMBER OF LANES	1 of 3 or 4 lanes	1 of 4 lanes	1 of 5 lanes
PRIORITY CUTOFF	Buses and taxis	3 + carpools	first 2 wks - 3 + carpools then 2 + carpools
HOURS OF OPERATION	6-10 am	SB - 24 hours	EB - 3-7 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS		66% at first, then after heavy enforcement dropped to 20%	6-7%
COMMENTS	The shoulder is used as the priority lane.		This is demonstration project until June, 1986. The data is for the first four months.

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (cont'd)

	N-7 I-95, Miami, Florida	N-8 Banfield Freeway, Portland, Oregon	N-9 I-45N, Houston, Texas
LOCATION			
YEAR IMPLEMENTED	1976	1975	1981
LENGTH/SIZE	7.7 miles	4 miles	3.3 miles
NUMBER OF LANES	1 of 4 or 5 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	1976 - 3 + carpools 1977 - 2 + carpools	3 + carpools	Buses and 8 + vanpools
HOURS OF OPERATION	Both directions 7-9 am 4-6 pm	1975 - 24 hours 1976 WB - 6:30-9:30 am EB - 3:30-6:30 pm	SB - 6-8:30 am
CURRENT STATUS	operational	operation suspended in 1982	operational
VIOLATIONS	During 3 + - 63% During 2 + - 36%	12%	2%
COMMENTS	Is connected to park-n-ride lot by exclusive ramp (F-2).	Operation suspended due to construction of light rail system. Express bus service began with opening of lane.	Operation in conjunction with contraflow lane (L-2). Uses shoulder lane. Will be replaced in near future by extension of separate roadway (K-8).

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (cont'd)

	N-10	N-11	N-12
LOCATION	I-5, Seattle, Washington	SR 520, Seattle, Washington	I-405, Seattle, Washington
YEAR IMPLEMENTED	1983	1973	1985
LENGTH/SIZE	5.5 miles	1.8 miles	2 miles
NUMBER OF LANES	1 of 4 or 5 lanes	WB 1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	3 + carpools	1973 - Buses only 1975 - 3 + carpools	2 + carpools
HOURS OF OPERATION	Both directions 24 hours	WB - 5:30-9:00 am	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Operates in conjunction with exclusive freeway ramps (F-3 & P-1)	Shoulder lane used.	

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (cont'd)

LOCATION	N-13 I-H1, Honolulu, Hawaii	N-14 I-H2, Ewa District, Hawaii	N-15 I-580, San Francisco, California
YEAR IMPLEMENTED	1979	1977	1977
LENGTH/SIZE	2.5 miles	5 miles	3.5 miles
NUMBER OF LANES	1 of 5 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	3 + carpools	3 + carpools	3 + carpools
HOURS OF OPERATION	6-8 am 3:30-5:30 pm	6-8 am 3:30-5:30 pm	6 am Monday to 6 pm Friday
CURRENT STATUS	operational	operation suspended in 1978	operations suspended in 1982
VIOLATIONS			
COMMENTS		Operation suspended because it was in a rural area and need was not there.	Operation suspended due to adverse public reaction of adding two lanes in each direction and then reserving for HOVs with a buffer lane. Also HOV use did not warrant it.

TREATMENT N: CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (cont'd)

	N-16	N-17	N-18
LOCATION	I-5, Seattle, Washington	55 Freeway, Los Angeles, California	I-4, Orlando, Florida
YEAR IMPLEMENTED	1970	1985	1979
LENGTH/SIZE	2 miles	13 miles	20-24 miles
NUMBER OF LANES	1 of 4 lanes	1 of 3 lanes	1 of 3 or 4 lanes
PRIORITY CUTOFF	2 + carpools	2 + carpools	2 + carpools
HOURS OF OPERATION	SB - 5 am-noon	24 hours	7-9 am 4-6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS		3-9%	
COMMENTS		Uses median shoulder.	FHWA mandated HOV lane or no reconstruction could be done.

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY OF THE ROADWAY	
N-1	No change in occupancy.
N-2	During 1974, 29,200 passengers were carried in 16,110 vehicles at an occupancy of 1.81 while in 1976, 30,800 passengers were carried in 16,723 vehicles at an occupancy of 1.84. Therefore, there was a reduction of 300 vehicles in the AM peak.
N-3	During 1974, the occupancy was 1.70 persons per vehicle while in 1976, the occupancy had increased to 1.75.
N-5	No increase in occupancy.
N-6	Before implementation, occupancy was 1.17 per vehicle (9285 vehicles, 10,864 persons) while after implementation the occupancy increased to 1.29 person per vehicle (8430 vehicles, 10,864 people). Therefore, there was a reduction of 850 vehicles.
N-7	Before implementation, occupancy in the AM peak was 1.24 and the PM peak occupancy was 1.31 while after implementation, the AM peak occupancy was 1.25 and the PM peak occupancy was 1.42 persons per vehicle.
N-8	The projected occupancy for 1977 was 1.22 persons per vehicle while the actual number after implementation was 2.10 persons per vehicle (5260 vehicles, 10,881 persons).
N-9	Before implementation, the occupancy was 1.60 persons per vehicle (12,382 vehicles, 12,723 persons) while the after occupancy rose to 1.70 persons per vehicle (12,600 vehicles, 13,461 persons).
INCREASE BUS TRANSIT USE	
N-1	No scheduled transit on the roadway.
N-2	Before implementation, buses carried 8400 passengers (27.9% of all roadway users). During bus only operation this increased 6.5% to 9000 passengers (29.4%) but when carpools were added this decreased 3.5% to 8600 passengers (27.3%).
N-3	Bus passengers accounted for 3% of all roadway users both before and after implementation.

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
N-5	There was no increase in bus ridership.
N-7	There was no bus service before implementation while afterwards 548 passengers rode the bus.
N-8	300 passengers rode the bus before implementation, while after implementation 633 passengers rode the bus.
INCREASE BUS RELIABILITY	
N-2	A reduction in bus layover time was allowed due to the increase reliability.
N-7	Before implementation, a travel time discrepancy of 2.5 minutes existed, while during the 3+ carpool operation this dropped to .2 minute.
INCREASE CARPOOLING AND VANPOOLING	
N-1	No large increases occurred.
N-2	In 1974 there were 690 carpools while in 1976, this number increased to 1060 carpools.
N-3	In 1974 there were 1320 carpools while in 1976, this number increased to 1540 carpools.
N-5	There was no change in carpools.
N-6	Before implementation, there were 1000 carpools while after implementation this number increased to 1350 carpools.
N-7	In the AM peak, before implementation there were 2185 2-person carpools and 334 3+ person carpools. During 3+ carpool implementation, these numbers went to 2474 and 611 while during 2+ carpool implementation, these numbers became 2714 and 492. In the PM peak before implementation, there were 2230 2-person carpools and 648 3+ person carpools. During 3+ carpools implementation these numbers went to 2981 and 760 while during 2+ carpool implementation these numbers become 3810 and 1036.
N-8	Before implementation there were 106 carpools which increased to 518 after implementation.
N-9	Before implementation 190 HOVs existed which in four months increased to 280 HOVs.

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
N-17	Before implementation in the AM and PM peak hours, 1560 carpools existed, this number increased to 2093 carpools after implementation.

REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY

N-1 & N-5	Since no increase in occupancy, no real reduction in need.
N-2	If half of the 300 eliminated trips were reduced during the peak hour, it is estimated that an additional year would be needed for the roadway to reach capacity.
N-3	The change in occupancy would cause an elimination of 120 vehicle trips in the peak hour. Because of these eliminated trips, it is estimated that an additional year would be needed for the roadway to reach capacity.
N-6	Because of the 850 vehicle trips eliminated, it is estimated that it would take an additional four years for the roadway to reach capacity.
N-7	The change in occupancy would cause an elimination of 500 vehicle trips in the peak hour. Because of these eliminated trips, it is estimated that an additional three years would be needed for the roadway to reach capacity.
N-8	The change in occupancy would cause an elimination of 1700 vehicle trips in the peak hour. Because of these eliminated trips, it is estimated that an additional 17 years would be needed for the roadway to reach capacity.
N-9	The change in occupancy would cause an elimination of 350 vehicle trips during the peak hour. Because of these eliminated trips, it is estimated that an additional three years would be needed for the roadway to reach capacity.

REDUCE CONGESTION ON THE ROADWAY

N-1	Before implementation travel time during the morning peak was 15.4 minutes while after implementation, the travel time for the general use lanes was 11.6 minutes and for the HOV lane was 10.7 minutes. During the evening peak before implementation, the travel time was 14.6 minutes while after implementation, the travel time for the general use

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
	lanes was 11.6 minutes and for the HOV lane was 10.8 minutes.
N-2	In 1974, the travel time was 8 minutes. In 1976, the travel time for the general use lanes was 5.5 minutes and for the HOV lane was 5 minutes.
N-3	In 1976, the travel time for the general use lanes was 12.2 minutes and for the HOV lane was 8.5 minutes.
N-4	Saved up to 15 minutes.
N-5	Before implementation there were 2 minute delays. After implementation there were no delays to HOVs and one to four minute delays for general lane users.
N-6	Before implementation, the travel time was 25 to 30 minutes. After implementation, the travel time for the general use lanes was 15 to 20 minutes and for the HOV lane was 8-9 minutes.
N-7	In 1975 during the morning peak, the travel time was 12.1 minutes. In 1977, the travel time for the general use lanes was 10.2 minutes and for the HOV lane was 7.1 minutes. In 1975 during the evening peak, the travel time was 12.9 minutes. In 1977, the travel time for the general use lanes was 9.1 minute and for the HOV lane was 7.6 minutes.
N-8	Before implementation, the travel time was 5.36 minutes. After implementation, the travel time for the general use lanes was 5.27 minutes and for the HOV lane was 3.88 minutes.
N-9	Before implementation, the travel time was 7.0 minutes. After implementation, the travel time for the general use lanes was 6.9 minutes and for the HOVs lane was 3.7 minutes.
N-17	Before implementation, the travel time was 35 minutes. Two weeks after implementation, the travel time for the general lanes was 14 to 19 minutes and for the HOV lanes was 12 to 13 minutes.
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
	(NOTE - assume a lane costs $500,000/mile in today's dollars.)

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
N-1 & N-5	No reduction in need, therefore no reduction in costs.
N-2	Save approximately $100,000.
N-3	Save approximately $60,000.
N-6	Save approximately $800,000.
N-7	Save approximately $575,000.
N-8	Save approximately $1.7 million.
N-9	Save approximately $250,000.

REDUCE AUTO USE ON THE ROADWAY

Save as Impact 1.

REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL

Same as Impact 7.

REDUCE TRAVEL COSTS FOR HOV USERS

N-3	Before implementation, operating costs based on vehicle miles (15¢/mile) are $8.9 million while afterward this cost was $7.6 million. Thus $1.3 million were saved, a 15% reduction.
N-8	$262,000 saved in travel time and operating costs reductions and $143,000 saved in fuel reduction for a total of $405,000 saved per year.

REDUCE ENERGY USE

N-1	In 1976, 21,400 gallons used while in 1981, 17,150 gallons used. This is a 20% reduction.
N-2	250,000 gallons per year saved.
N-8	230,000 gallons a year saved.
N-9	112,000 gallons a year saved.

IMPROVE AIR QUALITY

N-1	During both peaks before implementation, emissions were predicted to be 16,200 pound of CO, 2,220 pounds of HC, and 3150 pounds of NOx. After implementa- tion emissions were predicted to be 3150

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
	pounds of CO, 1300 pounds of HC, and 3600 pounds NOx. Thus CO was reduced 80% and HC was reduced 40%, while NOx increased 15%.
N-2	CO was reduced by .62 tons per day; HC was increased by .06 tons per day; NOx was increased by .08 tons per day.
N-8	CO and HC increased by 2%.
INCREASE TRANSIT'S OPERATING COSTS	
N-7	No bus service before, therefore no costs. For first 18 moths of service, the operating costs were $575,000, the revenue was $312,000 for a deficit of $263,000.
INCREASE GOVERNMENT'S OPERATING COSTS	
N-1	Costs of overtime for enforcement and equipment was $130,000 for the first 12 months.
INCREASE THE AMOUNT OF WEAVING ON THE ROADWAY	
N-1	Total lane changes increased after the implementation especially in the first mile after an interchange but rates were tolerable.
INCREASE ENFORCEMENT COSTS	
N-1	Enforcement Costs increased by $130,000 for the first 12 months.
N-2	During first 6 months,. 2 or 3 extra patrols were on the highway. No costs shown.
N-7	No special enforcement.
N-8	At first added one extra patrol, but because of high violation rate, went to saturation patrols of up to 6 extra patrols cars. No costs shown.
N-9	For first month, two extra patrols were used. No costs shown.
INCREASE ACCIDENTS INITIALLY	
N-1	Increased initially by approximately one accident per million vehicle miles but after 3 months returned to normal.

TREATMENT N - CONCURRENT FLOW FREEWAY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
N-2, N-3, N-5, N-6, N-8, N-9 & N-17	No statistical difference in accidents.
N-7	Accident rate actually went down from 4.48 accidents per MVM to 2.67 accidents per MVM.

NEGATIVE MEDIA COVERAGE

N-1	Overwhelming coverage opposed to the treatment.
N-2, N-6, & N-7	Good coverage.
N-3	Subdued coverage but usually good.

COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENTS

N-1	Violators fought payment of fines.
N-3	No court actions initiated.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE

	O-1	O-2	O-3
LOCATION	Rt. 9, Old Bridge, New Jersey	Prospect and Farrell Avenues, Milwaukee, Wisconsin	Rt. 22 at New Providence Road, Union County, New Jersey
YEAR IMPLEMENTED	1982	1981	1982
LENGTH/SIZE	NB - am - 1.2 mile SB - pm - 0.8 mile	1.0 mile	1.5 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	3 + carpools + right turns	Buses, bicycles, and right turns	Buses only
HOURS OF OPERATION	6:30 - 8 am 5:30 - 7 pm	7 - 9 am 3:30 - 5:30 pm	EB - 7 - 9 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS	NB - 30-70% SB - 30-50%		
COMMENTS	Operation jumps queue at signal.	Uses parking lane.	Uses shoulder.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-4 NW 7th Avenue, Miami, Florida	O-5 Barbour Boulevard, Portland, Oregon	O-6 Main Street, Rochester, New York
YEAR IMPLEMENTED	1975	1978	1979
LENGTH/SIZE	SB - 10 miles NB - 7.3 miles	1.8 miles	0.5 mile
NUMBER OF LANES	1 of 3 or 4 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	6:30-9:30 am 3:30-6:30 pm	24 hours
CURRENT STATUS	operation suspended in 1976	operation suspended in 1981	operation suspended in 1981
VIOLATIONS	5-6% of total traffic		
COMMENTS	Operation suspended when concurrent flow freeway lane on I-95 opened (N-7).	Used left turn lane. Operation suspended due to accidents and confusion with left turns.	Operation suspended because it wasn't enforced and therefore gave no advantage.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-7 Lake Avenue, Rochester, New York	O-8 Madison Avenue New York, New York	O-9 1st Street New York, New York
YEAR IMPLEMENTED	1971	1981	1982
LENGTH/SIZE	4 miles	.85 miles	1.9 miles
NUMBER OF LANES	1 of 6 lanes	2 of 5 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses and right turns
HOURS OF OPERATION	7-9 am 4-6 pm	2-7 pm	4-7 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS		2%	
COMMENTS		Good media coverage helped considerably.	Same as O-8.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-10 2nd Street, New York, New York	O-11 3rd Street, New York, New York	O-12 5th Street, New York, New York
YEAR IMPLEMENTED	1982	1982	1983
LENGTH/SIZE	1.4 miles	1.1 miles	1.3 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses and right turns
HOURS OF OPERATION	7-10 am 4-7 pm	7 am-7 pm	7 am-7 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Same as O-8.	Same as O-8.	Same as O-8.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-13 6th Street, New York, New York	O-14 8th Street, New York, New York	O-15 42nd Street, New York, New York
YEAR IMPLEMENTED	1982	1982	1982
LENGTH/SIZE	0.9 mile	0.8 mile	1.8 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses and right turns
HOURS OF OPERATION	4-7 pm	4-7 pm	7-10 am 4-7 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Sam as O-8.	Same as O-8.	Same as O-8.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-16 57th Street, New York, New York	O-17 Lexington Avenue, New York, New York	O-18 Church Street, New York, New York
YEAR IMPLEMENTED	1982	1982	1982
LENGTH/SIZE	0.7 mile	0.9 mile	0.7 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses and right turns
HOURS OF OPERATION	4-7 pm	7 am - 7 pm	7-10 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Same as O-8.	Same as O-8.	Same as O-8.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-19 Broadway Avenue, New York, New York	O-20 Sutter & Post Streets, San Francisco, California	O-21 Mission Street, San Francisco, California
LOCATION			
YEAR IMPLEMENTED	1982	1975	1977
LENGTH/SIZE	0.7 mile	Sutter - 1.0 mile Post - .75 mile	13 blocks
NUMBER OF LANES	1 of 3 lanes	1 of 4 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses, taxis, and right turns	Buses, taxis, and right turns
HOURS OF OPERATION	4-7 pm	1975 - 7 am-6 pm 1976 Post - 7-9 am Sutter - 4-6 pm	7-9 am 4-6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS		1975 - 3% 1976 - 12%	
COMMENTS	Same as O-8.	Enforcement is a problem.	Same as O-20.

TREATMENT O: CONCURRENT FLOW ARTERIAL LANE (cont'd)

LOCATION	O-22 Kalanianaole Highway, Honolulu, Hawaii	O-23 San Tomas Expressway, Santa Clara, California	O-24 Rt. 237, Santa Clara, California
YEAR IMPLEMENTED	1973	1982	1984
LENGTH/SIZE	.6 mile	5.5 miles	4.5 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	1974 - Buses only 1975 - 3+ carpools	2 + carpools	2 + carpools
HOURS OF OPERATION	WB - 6-8 am	NB - 6-9 am SB - 3-7 pm	WB - 5-9 am EB - 3-7 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS	10%	5-10%	am - 8-16% pm - 6-8%
COMMENTS	Operation connects with contraflow arterial lane (M-1). Most data is from bus only to 3 + carpool operation.	Used median shoulder. Then made regular lane of it.	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-25	O-26	O-27
LOCATION	U. S. Rt. 1 and South Dixie Highway, Miami Florida	Montague Expressway, Santa Clara, California	Charles Street, Baltimore, Maryland
YEAR IMPLEMENTED	1974	1983	1968
LENGTH/SIZE	5.5 miles	5 miles	15 blocks
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	2 + carpools	2 + carpools	Buses and right turns
HOURS OF OPERATION	7-9 am 4-6 pm	SB - 6-9 am NB - 3-7 pm	4-6:30 pm
CURRENT STATUS	Operation suspended in 1984	operational	operational
VIOLATIONS	8%		
COMMENTS	Operation suspended when elevated Metrorail opened. Operated in conjunction with contra-flow arterial lane (M-2).		Enforcement a major problem.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-28 Weybosset & Washington Streets, Providence, Rhode Island	O-29 Arlington Boulevard, Virginia	O-30 Wilson Boulevard, Virginia
YEAR IMPLEMENTED	1968	1974	1974
LENGTH/SIZE	6 blocks each	4.5 miles	2.9 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses only	1974 - Buses & right turns 1978 - 4 + carpools	Buses & right turns
HOURS OF OPERATION	8 am-6 pm	6:30-9 am 3:30-6 pm	6:30-9 am 3:30-6 pm
CURRENT STATUS	operational	operation suspended in 1983	operation suspended in 1980
VIOLATIONS			80 - 90%
COMMENTS	Uses parking lane.	Operation suspended due to low utilization and poor enforcement.	Operation suspended due to opening of new transit station, which reduced the number of buses by 70%.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-31 Benning Road N.E., Washington, D.C.	O-32 Conneticut Avenue N.W., Washington, D.C.	O-33 Constitution Avenue N.W., Washington, D. C.
YEAR IMPLEMENTED	1972	1973	1973
LENGTH/SIZE	1.4 miles	3.5 miles	.75 mile
NUMBER OF LANES	1 of 4 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles and right turns
HOURS OF OPERATION	WB - 7-9 am EB - 4-6 pm	SB - 7-9 am NB - 4-6 pm	Both directions 7-9 am 4-6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS		Operation will be suspended soom because subway station to open.	Same as O-32.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-34	O-35	O-36
LOCATION	Georgia Avenue N.W., Washington, D.C.	H Street N.W., Washington, D.C.	Independence Avenue S.W., Washington, D.C.
YEAR IMPLEMENTED	1974	1975	1972
LENGTH/SIZE	.025 mile	.65 mile	.5 mile
NUMBER OF LANES	1 of 3 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles, and right turns	Buses, taxis, motorcycles, and right turns	Buses, taxis, motorcycles, and right turns
HOURS OF OPERATION	SB - 7-9 am NB - 4-6 pm	EB 7-9 am 4-6 pm	WB - 4-6 pm
CURRENT STATUS	operation suspended in 1977	operational	operational
VIOLATIONS			
COMMENTS	Operation suspended due to low utilization.	Same as O-32.	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-37 M Street N.W., Washington, D.C.	O-38 M Street S.W., Washington, D.C.	O-39 Pennsylvania Avenue S.E., Washington, D.C.
YEAR IMPLEMENTED	1972	1974	1972
LENGTH/SIZE	.45 mile	.6 mile	1.5 miles
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles, and right turns	Buses, taxis, motorcycles, and right turns
HOURS OF OPERATION	WB 4-6 pm	WB - 7-9 am EB - 4-6 pm	WB - 7-9 am EB - 4-6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Same as O-32.		

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-40 South Capitol Street, Washington, D.C.	O-41 Wisconsin Avenue N.W., Washington, D.C.	O-42 7th Street N.W. & S.W., Washington, D.C.
YEAR IMPLEMENTED	1974	1977	1969
LENGTH/SIZE	.75 mile	3.4 miles	.4 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles and right turns
HOURS OF OPERATION	NB - 24 hours	SB - 7-9 am NB - 4-6 pm	Both directions 7-9 am 4-6 pm
CURRENT STATUS	operational	operational	operation suspended in 1972
VIOLATIONS			
COMMENTS		Same as O-32.	Operation suspended due to low utilization.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-43 13th Street N.W., Washington, D.C.	O-44 14th Street N.W. & S.W., Washington, D.C.	O-45 16th Street N.W., Washington, D.C.
YEAR IMPLEMENTED	1980	1970	1962
LENGTH/SIZE	.5 mile	.85 mile	1.0 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 2 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles, and right turns	Buses, taxis, motorcycles, and right turns	Buses, taxis, motorcycles and right turns
HOURS OF OPERATION	SB - 7-9 am NB - 4-6 pm	SB - 4-6 pm NB - 7-9 am 4-6 pm	SB - 7-9 am NB - 4-6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS		Same as O-32.	Same as O-32.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-46 K Street N.W., Washington, D.C.	O-47 South Capitol Street, Washington, D.C.	O-48 University Avenue, Madison, Wisconsin
LOCATION			
YEAR IMPLEMENTED	1974	1979	1976
LENGTH/SIZE	.8 mile	.5 mile	6 blocks
NUMBER OF LANES	1 of 2 lanes	1 of 3 lanes	1 of 5 lanes
PRIORITY CUTOFF	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles, and right turns	Buses and bicycles
HOURS OF OPERATION	WB - 4-6:30 pm	6:30-9:30 am	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS			

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-49 Mineral Point Road, Madison, Wisconsin	O-50 South Park Street, Madison, Wisconsin	O-51 Circling Capitol Plaza, Madison, Wisconsin
YEAR IMPLEMENTED	1981	1984	1977
LENGTH/SIZE	2 miles	.5 mile	8 blocks
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses, bicycles, and right turns	Buses and bicycles	Buses and bicycles
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS			

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-52 Baltimore Street, Baltimore, Maryland	O-53 Pratt Street, Baltimore, Maryland	O-54 Fuller Street, Ann Arbor, Michigan
YEAR IMPLEMENTED	1968	1968	1983
LENGTH/SIZE	15 blocks	15 blocks	1 mile
NUMBER OF LANES	1 of 4 lanes	1 of 5 lanes	1 of 2 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	3 + carpools and right turns
HOURS OF OPERATION	7 - 10 am 4 - 6:30 pm	4 - 6:30 pm	7:30 - 8:30 am 4:30 - 5:30 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Problem due to lack of enforcement.	Same as O-52.	Connects Main campus of The University of Michigan to the North Campus. Buses carry 18,000 passengers per day.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-55 Broadway Boulevard, Tuscon, Arizona	O-56 Raymond Boulevard and Broad Street, Newark, New Jersey	O-57 19th Street North, Birmingham, Alabama
YEAR IMPLEMENTED	1981	1975	1973
LENGTH/SIZE	6 miles	1 mile	6 blocks
NUMBER OF LANES	1 of 4 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses and right turns
HOURS OF OPERATION	24 hours	7 - 9 am 4 - 6 pm	7 - 9 am 4 - 6 pm
CURRENT STATUS	operational	operation suspended in 1977	operation suspended in 1981
VIOLATIONS			
COMMENTS		Operation suspended due to enforcement problems.	Operation suspended when buses shut down for a strike, then were redistributed when strike ended because of business outcry of people waiting for the bus blocking their store fronts.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-58 Vine Street, Philadelphia, Pa.	O-59 Main Street, Buffalo, New York	O-60 2nd and 4th Streets, Seattle, Washington
YEAR IMPLEMENTED	1973	1965	1976
LENGTH/SIZE	.5 mile	4 miles	.8 mile
NUMBER OF LANES	1 of 5 lanes	1 of 2 lanes	1 of 4 or 5 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses and right turns
HOURS OF OPERATION	4 - 6:30 pm	7 - 9 am 3 - 6 pm	7 - 9 am 4 - 6 pm
CURRENT STATUS	operation suspended in 1985	operation suspended in 1975	operational
VIOLATIONS			
COMMENTS	Operation suspended due to reconstruction of roadway. EPA mandated lane.	Operation suspended due to lack of utilization and new emphasis on light rail.	Uses parking lane.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-61 Fauntleroy Way, Seattle, Washington	O-62 Delridge Way, Seattle, Washington	O-63 Aurora Avenue, Seattle, Washington
YEAR IMPLEMENTED	1978	1978	1978
LENGTH/SIZE	1 mile	.25 mile	1.5 miles
NUMBER OF LANES	1 of 2 lanes	1 of 2 lanes	1 of 3 lanes
PRIORITY CUTOFF	3 + carpools	3 + carpools	3 + carpools
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation suspended in 1983	operation suspended in 1983	operational
VIOLATIONS	71%		45% - 4 - 6 pm
COMMENTS	Operation suspended due to bridge repair being completed. Bridge construction is why it was opened.	Same as O-61.	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-64 Locust Street, St. Louis, Missouri	O-65 Olive Street, St. Louis, Missouri	O-66 Lindell Avenue/Olive Street, St. Louis, Missouri
YEAR IMPLEMENTED	1976	1976	1982
LENGTH/SIZE	.5 mile	.5 mile	Lindell - 2 miles Olive - 1.75 miles
NUMBER OF LANES	1 of 4 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses and right turns
HOURS OF OPERATION	WB - 4 - 6 pm	7 - 9 am	7 - 9 am 4 - 6 pm
CURRENT STATUS	operational	operation suspended in 1982	operational
VIOLATIONS			
COMMENTS		Operation suspended due to reduction in the number of lanes during the modernization project.	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-67 Washington Street, St. Louis, Missouri	O-68 9th Street, St. Louis, Missouri	O-69 S. R. 522, Seattle, Washington
YEAR IMPLEMENTED	1982	1982	1975
LENGTH/SIZE	.5 mile	.4 mile	3.0 miles
NUMBER OF LANES	1 of 2 lanes	1 of 4 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses only
HOURS OF OPERATION	4 - 6 pm	4 - 6 pm	SB - 6 - 9 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS			Uses shoulder.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-70	O-71	O-72
LOCATION	Broadway and Lincoln Avenues, Denver, Colorado	Larimer/Lawrence Street, Denver, Colorado	Main and Walnut Streets, Kansas City, Missouri
YEAR IMPLEMENTED	1974	1974	1975
LENGTH/SIZE	3 miles	.5 mile	Main - .25 mile Walnut - .5 mile
NUMBER OF LANES	1 of 4 lanes	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turns	3 + carpools	Buses and right turns
HOURS OF OPERATION	Broadway (SB) 4:30-5:30 pm Lincoln (NB) 7:30-8:30 am 3:30-5:30 pm	Lawrence 7:30 - 8:30 am Larimer 4:30 - 5:30 pm	7 - 9 am 4 - 6 pm
CURRENT STATUS	operational	operation suspended in 1985	operational
VIOLATIONS			
COMMENTS	Parking restrictions are not enforced where lane uses parking lane.	Operation suspended due to low utilization.	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-73 Houston Street, San Antonio, Texas	O-74 Throckmorten Street, Fort Worth, Texas	O-75 Washington Street, Chicago, Illinois
YEAR IMPLEMENTED	1979	1974	1955
LENGTH/SIZE	.1 mile	.5 mile	.6 mile
NUMBER OF LANES	1of 4 lanes	1 of 2 lanes	1 of 5 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operation suspended in 1970
VIOLATIONS			
COMMENTS		Problem with lack of enforcement. Both Houston and Throckmorten may become transit malls after major reconstruction.	Operation suspended due to narrow lanes. Roadway was restriped and bus lane eliminated. Bus lane was middle lane.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

	O-76 Main Street, Houston, Texas	O-77 Louisiana & Smith Streets, Houston, Texas	O-78 Fannin Street, Houston, Texas
LOCATION			
YEAR IMPLEMENTED	1975	Louisiana - 1980 Smith - 1982	1983
LENGTH/SIZE	.6 mile	Louisiana - .3 mile Smith - .2 mile	3 blocks
NUMBER OF LANES	1 of 3 lanes	1 of 5 lanes	1 of 5 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	Smith - 6 - 9 am Louisiana - 4 - 6 pm	6 - 9 am 4 - 6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	All bus transfers occur here so very heavy use.	Mostly express buses.	Serves a medical center but has low bus volumes.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-79 Harry Hines Boulevard, Dallas, Texas	O-80 Elm-Commerce & Fort Worth Avenues, Dallas, Texas	O-81 Geary-O'Farrell Streets, San Francisco, California
YEAR IMPLEMENTED	1970	1974	1979
LENGTH/SIZE	2 miles	2 miles	Geary - 6 blocks O'Farrell - 10 blocks
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses, taxis and right turns
HOURS OF OPERATION	Both directions 7 - 9 am 4 - 6 pm	Both directions 7 - 9 am 4 - 6 pm	O'Farrell - 7 - 9 am Geary - 4 - 6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Enforcement a problem.	Same as O-79.	Same as O-79.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-82 Victory Boulevard, Staton Island, New York	O-83 Hillside Avenue, New York, New York	O-84 Second Street, Harrisburg, Pennsylvania
YEAR IMPLEMENTED	1963	1969	1971
LENGTH/SIZE	1.9 miles	4.2 miles	.5 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses and right turns	Buses and right turns	Buses only
HOURS OF OPERATION	7 - 9 am 4 - 7 pm	7 - 9 am 4 - 7 pm	7 - 9 am 4 - 6 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS	no problems		
COMMENTS	260 buses carry 12,400 passengers.	620 buses carry 28,400 passengers; uses parking lane.	Uses parking lane. Problem with lack of enforcement.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-85 4th Street, Nashville, Tennessee	O-86 Rt. 528, Ocean City, Maryland	O-87 11th Street, San Diego, California
YEAR IMPLEMENTED	1956	1985	1974
LENGTH/SIZE	.4 mile	8 miles	.5 mile
NUMBER OF LANES	1 of 3 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses only	Buses and right turns	Buses only
HOURS OF OPERATION	7 - 9 am 4 - 6 pm	24 hours	4 - 6:30 pm
CURRENT STATUS	operation suspended, reason unknown.	operational	operational
VIOLATIONS			
COMMENTS			

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-88 York Road, Baltimore, Maryland	O-89 H Street N.W., Washington, D.C.	O-90 H Street N.E., Washington, D.C.
YEAR IMPLEMENTED	1974	1964	1972
LENGTH/SIZE	8 miles	.3 mile	1.2 miles
NUMBER OF LANES	1 of 2 lanes	1 of 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses and right turns	Buses, taxis, motorcycles and right turns	Buses, taxis, motorcycles, and right turns
HOURS OF OPERATION	7 - 9 am 4 - 6 pm	7 - 9 am 4 - 6 pm	7 - 9 am 4 - 6 pm
CURRENT STATUS	operation suspended in 1977	operational	operational
VIOLATIONS			
COMMENTS	Operations suspended due to high violation rates caused by lack of enforcement.	Same as O-32 .	

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-91 Avalon Way, Seattle, Washington	O-92 I-90, Seattle, Washington	O-93 Fayette Street, Baltimore, Maryland
YEAR IMPLEMENTED	1978	1982	1968
LENGTH/SIZE	.75 mile	.75 mile	12 blocks
NUMBER OF LANES	1 of 2 lanes	1 of 3 or 4 lanes	1 of 4 lanes
PRIORITY CUTOFF	3 + carpools	3 + carpools	Buses and right turns
HOURS OF OPERATION	24 hours	4 - 6 pm	4 - 6:30 pm
CURRENT STATUS	operation suspended in 1983	operation suspended in 1983	operational
VIOLATIONS			
COMMENTS	Operation suspended due to low utilization.	Operation suspended due to low utilization.	Problems due to lack of enforcement.

TREATMENT O: CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (cont'd)

LOCATION	O-94 Market Street, Philadelphia, PA	O-95 Market Street, Newark, NJ
YEAR IMPLEMENTED	1982	1956
LENGTH/SIZE	.7 mile	.3 mile
NUMBER OF LANES	1 of 3 lanes	1 of 3 lanes
PRIORITY CUTOFF	Buses and right turn	Buses only
HOURS OF OPERATION	24 hours	4 - 6 pm
CURRENT STATUS	operational	operation suspended in 1975
VIOLATIONS		
COMMENTS	Accident problem with pedestrians not looking in direction of lane. Reconstruction in 1986 will remove median which is the problem.	Maintenance crew offset the center line each day. The cost of this maintenance operation was not considered cost effective. Therefore, operation suspended.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE

TREATMENT NUMBER	IMPACT
INCREASE THE PERSON CARRYING CAPABILITY OF THE ROADWAY	
O-1	No increase in occupancy during the morning peak, but during the evening peak the occupancy rate went from 2.07 persons per vehicle to 2.38 persons per vehicle.
O-3	Increased bus use by 200 passengers.
O-4	During the morning peak the occupancy increased from 1.64 to 1.77 persons per vehicle while during the evening peak, the occupancy increased from 1.63 to 1.70.
O-8	Buses increased from 683 buses to 739 buses.
O-9 - O-19	No change in occupancy or bus riders.
O-22	Occupancy increased from 1.65 to 1.79 persons per vehicle.
O-24	During the morning peak, the occupancy increased from 1.20 to 1.25 persons per vehicles, while during the evening peak, the occupancy increased from 1.30 to 1.33 persons per vehicle.
O-25	The lane carried 2400 more people in 350 less vehicles.
O-29	The lane increased through put by 2%.
INCREASE BUS TRANSIT USE	
O-2	Bus ridership was reduced from 1977 to 1848 passengers, a 6.5% loss. However, due to a fare increase, systemwide use decreased 7%, therefore, there was no change.
O-4	During the AM peak, bus ridership increased from 673 passengers to 751 while during the PM peak, bus ridership increased from 570 to 707 passengers.
O-5	Slight decline in bus ridership from 1977 to 1980 but two fare increases have more than doubled the fare from 40¢ to 90¢.
O-8	Within 17 months, local bus ridership increased 31% from 9450 to 12,385 passengers, while express bus ridership increased 6% from 14,614 to 15,524 passengers.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
O-9 - O-19, O-22	No increase in bus ridership.
O-20	30% increase in bus ridership.
O-25	Bus ridership increased 400% from 400 to 1900 - 2100 passengers.
O-29	Bus ridership increased 10%.
O-30	Bus ridership increased 85% from 1060 to 1875 passengers.
INCREASE BUS TRANSIT RELIABILITY	
O-2	Route variance on Farrell Avenue was reduced from 3:58 to 2:48 minutes while on Prospect Avenue it was reduced from 5:16 to 4:13 minutes.
O-4	No numbers but route variance reduced.
O-8	Standard deviation as a percentage of mean travel time was reduced from 40.4% to 26.9% for express buses during the peak hours and from 39.8% to 16.4% for local buses.
O-20	26% reduction in late buses.
O-21	37% reduction in transit vehicles turning back short of their terminal to maintain their schedule.
INCREASED CARPOOLING AND VANPOOLING	
O-1	During morning peak, carpools went from 5.1 to 6.6% of the road users, while during the evening peak, carpools went from 5.6 to 9.0% of the road users.
O-2	Carpools increased 19% from 1330 to 1590.
O-22	Carpools increased 45% from 820 to 1195.
O-23	People in carpools increased 150% from 2600 to 6500.
O-24	During the morning peak, people in carpools increased 30% from 1838 to 2381, while in the evening peak, they increased 21% from 2109 to 2555.
O-25	Carpools increased 17% from 2880 to 3370.
O-26	Persons in carpools increased 45% from 3500 to 5100.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
O-1	During the morning peak, no increase in occupancy, therefore no reduction. During the afternoon peak, the change in occupancy eliminates 250 vehicle trips per hour. Because of these eliminated trips, it is estimated that it would take an additional 5 years for this roadway to reach capacity.
O-3	The increased bus use eliminates 170 vehicle trips. If 2/3 of these are eliminated during the peak hour, it is estimated that an additional year would be needed for the roadway to reach capacity.
O-4	The increase in occupancy would eliminate 165 to 300 vehicle trips per hour. Because of these eliminated trips, it is estimated that it would take an additional 2 to 3 years for the roadway to reach capacity.
O-8	If one quarter of additional buses occur during the peak hour, 470 vehicle trips are eliminated. Because of these eliminated trips, it is estimated that it would take an additional three years for this roadway to reach capacity.
O-9 - O-19	No change in occupancy, therefore no reduction.
O-22	The change in occupancy would eliminate 315 vehicle trips per hour. Because of these eliminated trips, it is estimated that it would take an additional three years for this roadway to reach capacity.
O-24	The change in occupancy would eliminate 100 to 160 vehicle trips per hour. Because of these eliminated trips, it is estimated that it would take an additional year or two for the roadway to reach capacity.
O-25	If one third of reduced vehicle trips occurred in peak hour, 785 vehicle trips would be eliminated during the peak hour. Because of these eliminated trips, it is estimated that an additional eight years would be needed for the roadway to reach capacity.
O-29	Due to the input increase, 100 trips would be eliminated in the peak hour. Because of these eliminated trips, it is estimated that an additional year would be needed for the roadway to reach capacity.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE CONGESTION ON THE ROADWAY	
O-1	During the morning peak, the travel time before implementation of 6.6 minutes was reduced to 5 minutes for the general use lanes and 1.5 minutes for the HOV lane. During the evening peak, the travel time before implementation of 5 minutes was reduced to 2 minutes for the general use lanes and 1.5 minutes for the HOV lane.
O-2	Farrell Avenue's travel time reduced from 6 minutes to 5 minutes while Prospect Avenue's travel time was increased from 5 minutes to 6 minutes.
O-3	5 to 15 minutes saved.
O-4	During the morning peak, travel time was reduced from 23.5 to 19.0 minutes, while in the evening peak, travel time was reduced from 23.6 to 21.3 minutes.
O-5	Buses saved 1.5 minutes.
O-6	5 minutes saved.
O-7	8 to 10 minutes saved.
O-8	Express buses' travel time reduced from 15.3 to 11.5 minutes while local buses' travel time reduced from 16.1 to 11.1 minutes.
O-9	Bus travel time reduced from 20.4 to 16.8 minutes while travel time in the general lanes increased from 7.2 to 10.0 minutes.
O-10	Bus travel time reduced from 15.8 to 13.1 minutes while the general use lane's travel time was reduced from 6.8 to 6.6 minutes.
O-11	Bus travel time reduced from 13.5 to 10.2 minutes while the general use lane's travel time was reduced from 9.7 to 5.1 minutes.
O-13	Bus travel time reduced from 10.8 to 9.5 minutes while the general use lane's travel time was reduced from 7.8 to 6.1 minutes.
O-14	Bus travel time increased from 10.0 to 10.2 minutes, while the general use lane's time increased from 7.2 to 7.6 minutes.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
O-15	Eastbound bus travel time decreased from 28.4 to 18.3 minutes, while the general use lane's travel time decreased from 16.1 to 14.2 minutes. Westbound bus travel time decreased from 24.5 to 23.5 minutes while the general use lane's travel time decreased from 18.9 to 15.0 minutes.
O-16	Bus travel time decreased from 10.2 to 7.6 minutes while the general use lanes' travel time increased from 6.8 to 8.1 minutes.
O-17	Bus travel time decreased from 11.7 to 11.3 minutes while the general use lanes' travel time increased from 5.8 to 6.5 minutes.
O-18	Bus travel time decreased from 9.8 to 7.0 minutes while the general use lanes' travel time decreased from 6.0 to 5.6 minutes.
O-19	Bus travel time increased from 7.5 to 7.6 minutes while the general use lanes' travel time decreased from 6.5 to 5.3 minutes.
O-20 & O-21	No change in travel time.
O-22	Before implementation, the travel time was 10.2 minutes. After implementation, the general use lanes' travel time was 9.8 minutes while the HOV lanes was 6.9 minutes.
O-23	During the morning peak, the "before" travel time of 19.5 minutes was reduced to 16.5 minutes for the general use lanes and 9 minutes for the HOV lane. During the evening peak, the "before" travel time of 19.0 minutes was reduced to 18.0 minutes for the general use lanes and 11.5 minutes for the HOV lane.
O-24	During the morning peak, the "before" travel time of 13.5 minutes was reduced to 9 minutes for the general use lanes and 6.5 minutes for the HOV lane. During the evening peak, the "before" travel time of 20.0 minutes was reduced to 14.5 minutes for the general use lanes and 10.0 minutes for the HOV lane.
O-25	During the morning peak, the "before" travel time of 19.6 minutes was reduced to 17.8 for the general use lanes and 6 to 9 minutes for the HOV lane. During the evening peak, the "before" travel time of 19.6 minutes was reduced to 17.8 for the general use lanes and 6 to 9 minutes for the HOV lane.

TREATMENT 0 - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
0-26	HOVs save 53% or 12 minutes.
0-29	2.7 minutes saved.
0-30	2.0 minutes saved.
0-80	HOVs saved 23%
0-88	During the morning peak, buses' travel time decreased from 32.4 to 31.4 minutes while the general use lanes' travel time increased from 17.9 to 19.6 minutes. During the evening peak, buses' travel time increased from 33.8 to 34.5 minutes while the general use lanes' travel time increased from 19.9 to 23.1 minutes.
0-94	HOVs saved 1.5 minutes.

REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION

(NOTE - assume a lane costs $500,000/mile in today's dollars.)

0-1	Save approximately $100,000.
0-3	Save approximately $37,500.
0-4	Save approximately $500,000 to $750,000.
0-8	Save approximately $65,000.
0-9 - 0-19	No reduction, therefore no savings.
0-22	Save approximately $45,000.
0-24	Save approximately $115,000 to $225,000.
0-25	Save approximately $1.1 million.
0-29	Save approximately $115,000.

REDUCE AUTO USE ON THE ROADWAY

Same as Impact 1.

REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL

Same as Impact 7.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE TRAVEL COSTS FOR HOV USERS	
O-22	Based on vehicle miles, "before" costs of $3.9 million were reduced to $3.65 million or a 6% reduction.
O-25	Savings of $3,600 per day.
REDUCE ENERGY USE	
O-2	"Before" energy use of 82,600 gallons was increased to 86,800 gallons, a 25% increase.
IMPROVE AIR QUALITY	
O-2	CO emissions increased from 104,500 to 109,500 pounds, or a 5% increase. HC emissions increased from 8550 to 8980 pounds or a 5% increase, NOx emissions increased from 9360 to 9810 pounds or a 5% increase.
INCREASE TRANSIT'S OPERATING COSTS	
O-3	Increased a small amount.
INCREASE ENFORCEMENT COSTS	
O-4	No increase.
O-8	$120,000 per year for enforcement.
O-9 - O-19	$2.1 million for first 15 months of operation. Will be greatly reduced.
O-25	Six additional officers used.
INCREASE PARKING NEEDS	
O-1 & O-22	No parking allowed before.
O-86	Parking removed. Need met by changing side street parallel parking to diagonal parking.
INCREASE ACCIDENTS INITIALLY	
O-2, O-20, O-23 & O-26	No increase in accidents.
O-4	21 bus accidents after startup. After 9 months, rate settled back down to normal.

TREATMENT O - CONCURRENT FLOW ARTERIAL PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
O-5	Before, one accident every 1400 hours. After, one accident every 226 hours.
O-21	50% reduction in bus accidents (20 to 10).
O-22	"Before" accident rate of 2.03 accidents per MVM increased to 2.23.
O-24	For 9 month period, "before" there were 148 accidents, "after" there were 245 accidents.
O-55	Bus accidents were reduced from 18 "before" accidents to none "after".

NEGATIVE MEDIA COVERAGE

O-1	Mix of good and bad coverage.
O-8 - O-19, O-22 & O-86	Extremely good coverage.

COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENTS

O-1, O-3, O-8 - O-19 & O-22	No Court actions.

TREATMENT P: EXCLUSIVE BYPASS RAMP

	P-1	P-2	P-3
LOCATION	Union Place from I-5, Seattle, Washington	U.S. Highway 45, Zoo Freeway & Watertown Planck Road, Milwaukee, Wisconsin	I-94, NS Freeway at College Avenue, Milwaukee, Wisconsin
YEAR IMPLEMENTED	1970	1976	1975
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	2 + carpools	1976 - Buses only 1984 - 2 + carpools	1975 - Buses only 1984 - 2 + carpools
HOURS OF OPERATION	SB - 5:00 am - Noon	24 hours	24 hours
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Exclusive ramp off reversible median lane for HOVs (N-10).	Connects to park-n-ride lot.	Same as P-2.

TREATMENT P: EXCLUSIVE BYPASS RAMP (cont'd)

	P-4 13th Street ramp from I-94, Milwaukee, Wisconsin	P-5 O'Hare Airport to State Route 190, Chicago, Illinois	P-6 69th Street, Chicago, Illinois
LOCATION			
YEAR IMPLEMENTED	1975	1972	1969
LENGTH/SIZE			.1 mile
NUMBER OF LANES			2 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operation suspended in 1984	operational
VIOLATIONS			
COMMENTS	Problems due to low utilization.	Ramp connected rail station to airport and allowed buses to save two miles. Operation suspended due to rail line connecting to airport terminal.	Allows buses access over expressway to trainst station from the local streets.

TREATMENT P: EXCLUSIVE BYPASS RAMP (cont'd)

LOCATION	P-7 95th Street, Chicago, Illinois	P-8 Harlem Avenue, Chicago, Illinois
YEAR IMPLEMENTED	1969	1983
LENGTH/SIZE	.1 mile	.1 mile
NUMBER OF LANES	2 lanes	2 lanes
PRIORITY CUTOFF	Buses only	Buses only
HOURS OF OPERATION	24 hours	24 hours
CURRENT STATUS	operational	operational
VIOLATIONS		
COMMENTS	Same as P-6.	Same as P-6.

TREATMENT P - EXCLUSIVE BYPASS RAMP

TREATMENT NUMBER	IMPACT
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
P-1	Saved 5 to 10 minutes.

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP

	Q-1	Q-2	Q-3
LOCATION	Washington St. ramp onto Route 163, San Diego, California	6 ramps onto Route 8, San Diego, California	9 ramps onto Route 94, San Diego, California
YEAR IMPLEMENTED	1974	1981, 82 & 83	1981, 82, & 83
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	2 + carpools	2 + carpools and motorcycles	2 + carpools and motorcycles
HOURS OF OPERATION	SB - 6:30-9:00 am	6 - 9 am 3 - 6:30 pm	6 - 9 am 3 - 6:30 pm
CURRENT STATUS	operational	operational except Fletcher Parkway	operational
VIOLATIONS	10 - 15%	4 - 35%	4 - 35%
COMMENTS		AM operation: Johnson Avenue El Cojon Boulevard Jackson Drive Waring Road Fletcher Parkway PM operation: Texas Street Fletcher ramp suspended due to lack of storage space and difficult turn into lane.	AM operation: Rt. 9494 Spring Street Massachusetts Avenue College Grove Way Kelton Road 49th Street Rt. 805 Rt. 15SB PM operation: 25th Street

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

	Q-4	Q-5	Q-6
LOCATION	16 ramps onto I-5, Portland, Oregon	8 ramps onto I-5, Seattle, Washington	11 ramps onto I-35W, Minneapolis, Minnesota
YEAR IMPLEMENTED	1981	1981	9 ramps - 1974 2 ramps - 1978, 1979
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	2 + carpools	3 + carpools	9 ramps - Bus only (2 changed to 3 + carpools in 1975-1977) 2 ramps - 3 + carpools
HOURS OF OPERATION	6:30-9:30 am 3:30-6:30 pm	24 hours	6:30-9:00 am 3:30-6:00 pm
CURRENT STATUS	operational except two NB ramps	operational	operational
VIOLATIONS	very few	7-48%	19%
COMMENTS	7 southbound morning ramps, 9 northbound evening ramps, Bypasses started same time as ramp metering, hard to tell advantages. Two ramps suspended due to volume problems on the freeway.	SB operation: 44th Avenue 236th Street, SW 205th Street, NE 175th Street 130th Street 85th Street 45th Street NB operation: 85Th Street	NB Bus only: T.H. 13(3 + 1977) 98th Street 76th Street 66th Street Xerxes Avenue Diamond Lake Road 46th Street 35th Street NB 3 + carpool: Dakota County Rd. 42 SB Bus only: Grant St. (3 + carpool 1975) SB 3 + carpool: 98th Street

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TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

LOCATION	Q6 (cont'd) 11 ramps onto I-35W, Minneapolis, Minnesota
YEAR IMPLEMENTED	
LENGTH/SIZE	
NUMBER OF LANES	
PRIORITY CUTOFF	
HOURS OF OPERATION	
CURRENT STATUS	
VIOLATIONS	
COMMENTS	Analysis numbers of Grant St. going from bus only to 3 + carpool operation. Bus numbers were high from bypass in "before" numbers. Violation rates on existing bypass ramps having a negative impact on expanding treatment to other ramps. Ramps further from city may have more potential of increasing carpooling.

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

	Q-7	Q-8	Q-9
LOCATION	13 ramps onto I-5, Los Angeles, California	4 ramps onto Highway 50, Sacramento, California	2 ramps onto I-405, 8 ramps onto I-10, 3 ramps onto I-5, Los Angeles, California
YEAR IMPLEMENTED	1974-77	1983	1973-75
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	2 + carpools	Bus only - SB Hornet St. 2 + carpools & motorcycles SB Watt Avenue NB Howe Avenue NB & SB 59th Street	2 + carpools
HOURS OF OPERATION	NB - 6:30-8:45 am SB - 4-6 pm	6-9 am	6-9 am 3:30-6:00 pm
CURRENT STATUS	operational	operational	operational
VIOLATIONS	26 - 36%	6.5%	2 - 50%
COMMENTS	NB operation: Pasadena Ave., Stadium Way, EB Los Feliz Blvd., Colorado Blvd., WB Western Ave., Hollywood Way. SB operation: Branford St., Tuxford St., Roscoe Blvd., EB Burbank Blvd., WB & EB Western Ave., Los Feliz Blvd. Smaller improvement than expected.		AM operation: I-405, Hawthorne I-10EB Manning, Venice, Vermont, Western I-5 Western PM operation: I-405 Lakewood I-10WB Hoover, Western, Crenshaw, Fairfax I-5 Los Feliz Stadium Way

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TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

LOCATION	Q-9 (cont'd) 2 ramps onto I-405, 8 ramps onto I-10, 3 ramps onto I-5, Los Angeles, California
YEAR IMPLEMENTED	
LENGTH/SIZE	
NUMBER OF LANES	
PRIORITY CUTOFF	
HOURS OF OPERATION	
CURRENT STATUS	
VIOLATIONS	
COMMENTS	Data did not look at ramps without bypasses, therefore don't know if carpool increase is new carpools or diverted ones.

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

	Q-10 Ferguson Road onto I-30 Dallas, Texas	Q-11 Wolfe Road onto I-280 San Francisco, California	Q-12 68th St, onto I-94, Milwaukee, Wisconsin,
YEAR IMPLEMENTED	1979	1975	1983
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	3 + carpools	2 + carpools	Buses only
HOURS OF OPERATION	7 - 9 am	6 - 9 am	6:55 - 8:10 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Lack of enforcement a problem.	Nominal time savings.	Park-N-Ride lot located at this ramp.

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

	Q-13	Q-14	Q-15
LOCATION	Holt Avenue onto I-94, Milwaukee, Wisconsin	North Avenue onto I-43, Milwaukee, Wisconsin	3 ramps onto I-59, Houston, Texas
YEAR IMPLEMENTED	1981	1977	1976 - Belair, Hillcroft 1983 - Bissonett
LENGTH/SIZE			
NUMBER OF LANES			
PRIORITY CUTOFF	Buses only	Buses only	Buses and 8 + vanpools
HOURS OF OPERATION	6:45 - 8:00 am	4:20 - 5:30 pm	6 - 9 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS			
COMMENTS	Same as Q-12.		

TREATMENT Q: PREFERENTIAL BYPASS AT A METERED RAMP (cont'd)

LOCATION	Q-16 3 ramps onto I-25 1 ramp onto I-225, Denver, Colorado	Q-17 228 ramps on 10 freeways, Los Angeles, California
YEAR IMPLEMENTED	1981 - Hampdon, NB Colorado 1983 Bellvue - Parker (I-225)	1973 - 1985
LENGTH/SIZE		
NUMBER OF LANES		
PRIORITY CUTOFF	Buses only	2 + carpools
HOURS OF OPERATION	6:30 - 8:30 am	6 - 9 am 3:30 - 6:00 pm
CURRENT STATUS	operational	most are operational
VIOLATIONS	7-8%	
COMMENTS	Parker Rd. has park-n-ride lot located at it. More ramp bypasses planned for future.	Highways include: Rt. 710, Rt. 91, I-405, I-5, I-10, I-110, U.S. 101, I-605, Rt. 60, Rt. 118. Ramps of Q-7 and Q-9 included in this total.

TREATMENT Q - PREFERENTIAL BYPASS AT A METERED RAMP

TREATMENT NUMBER	IMPACT
INCREASE THE PERSON CARRYING CAPABILITY OF THE ROADWAY	
Q-1	Occupancy increased from 1.22 to 1.27 persons per vehicle.
Q-2	Occupancy increased from 1.24 to 1.43 persons per vehicle.
Q-3	At Massachusetts Avenue, occupancy increased from 1.19 to 1.30 persons per vehicle.
Q-6	Bus ridership increased from 1100 to 8800 in peak period.
Q-7	During AM peak, no occupancy change on all ramps (bypass and no bypass), while during the PM peak the occupancy increased from 1.20 to 1.22 persons per vehicle.
Q-8	No increase in occupancy.
Q-9	No occupancy increases at Fairfax, but Lakewood's occupancy increased from 1.23 to 1.56 persons per vehicle.
INCREASE CARPOOLING AND VANPOOLING	
Q-1	Increased carpools from 20% (134 of 669 vehicles) in 1981 to 24.2% (102 of 421 vehicles) in 1985.
Q-2	Increased carpools from 17.5% (60 of 343 vehicles) in 1983 to 35.6% (177 of 497 vehicles) in 1985.
Q-3	Increased carpools from 16.5% (97 of 589 vehicles) in 1983 to 26.8% (201 of 749 vehicles) in 1985.
Q-6 & Q-8	No increase in carpools.
Q-7	During the morning peak, carpool percentage (14.8%) didn't change, while in the evening peak, carpools increased from 18.4% (2864 of 15,582 vehicles) to 19.8% (3271 of 16,482 vehicles).
Q-9	Fairfax Avenue carpool percentage (21%) didn't change, while at Lakewood carpools increased from 17% (125 of 735 vehicles) to 39% (351 of 900 vehicles).

TREATMENT Q - PREFERENTIAL BYPASS AT A METERED RAMP (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY (ASSUME 3 LANE ROADWAY)	
Q-1	Due to occupancy increase, 240 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that two additional years would be needed for the roadway to reach capacity.
Q-2	Due to occupancy increase, 800 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that five additional years would be needed for the roadway to reach capacity.
Q-3	Due to occupancy increase, 500 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that three additional years would be needed for the roadway to reach capacity.
Q-6	If half the new bus riders were in the peak hour, 3000 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that an additional 21 years would be needed for the roadway to reach capacity.
Q-7	Due to occupancy increase, 100 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that an additional year would be needed for the roadway to reach capacity.
Q-8	No increase in occupancy, therefore no decrease in need.
Q-9	Due to occupancy increase, 1270 vehicle trips would be eliminated. Because of these eliminated trips, it is estimated that an additional eight years would be needed for the roadway to reach capacity.
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
	(NOTE - assume a lane costs $500,000/mile in today's dollars.)
Q-1	Save approximately $50,000 per mile of roadway.
Q-2	Save approximately $125,000 per mile of roadway.
Q-3	Save approximately $75,000 per mile of roadway.
Q-6	Save approximately $525,000 per mile of roadway.
Q-7	Save approximately $25,000 per mile of roadway.

TREATMENT Q - PREFERENTIAL BYPASS AT A METERED RAMP (CONT'D)

TREATMENT NUMBER	IMPACT
Q-8	No savings.
Q-9	Save approximately $200,000 per mile of roadway.
REDUCE AUTO USE ON THE ROADWAY	
	Same as Impact 1.
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
Q-2 & Q-3	HOVs save 3 to 6 minutes.
Q-4	HOVs save from .2 to 1.5 minutes.
Q-5	HOVs save 1 to 8 minutes.
Q-6	HOVs save .5 minutes.
Q-7	HOVs save 1 minute.
Q-8	HOVs save 1 to 2 minutes.
Q-9	HOVs save .5 to 5 minutes.
INCREASE ENFORCEMENT COSTS	
Q-7	Use present patrols, therefore no additional costs.
INCREASE ACCIDENTS INITIALLY	
Q-7	No increase.
COURT ACTIONS INITIATED AGAINST PRIORITY TREATMENTS	
Q-7 & Q-8	No actions initiated.

TREATMENT R: TOLL FACILITY PREFERENTIAL LANE

	R-1 Rt. 495, New Jersey	R-2 Rt. 95-George Washington Bridge, New Jersey	R-3 Long Island Expressway, New York, New York
LOCATION			
YEAR IMPLEMENTED	1970	1973	1971
LENGTH/SIZE	2.5 miles	1 mile	2.2 miles
NUMBER OF LANES	1 of 4 lanes	1 of 6 lanes	1 of 4 lanes
PRIORITY CUTOFF	Buses only	Buses only	Buses and taxis
HOURS OF OPERATION	7:30 - 9 :30 am	7:30 - 9:30 am	7 - 10 am
CURRENT STATUS	operational	operational	operational
VIOLATIONS	none		
COMMENTS	Contraflow operation.		Contraflow operation.

TREATMENT R: TOLL FACILITY PREFERENTIAL LANE (cont'd)

	R-4 Gowanus Expressway, New York, New York	R-5 Oakland Bay Bridge, San Francisco, California
LOCATION		
YEAR IMPLEMENTED	1980	1971
LENGTH/SIZE	.9 mile	.6 mile
NUMBER OF LANES	1 of 4 lanes	1 of 5 lanes 3 of 19 toll booths
PRIORITY CUTOFF	Buses only	1971 - Buses only 1972 - 3 + carpools
HOURS OF OPERATION	7 - 9:30 am	6 - 9 am 3 - 6 pm
CURRENT STATUS	operational	operational
VIOLATIONS		4 - 5 %
COMMENTS	Contraflow operation. Buses have own tube of Brooklyn Battery Tunnel	Operation in conjunction with preferential toll charge (A-5).

TREATMENT R - TOLL FACILITY PREFERENTIAL LANE

TREATMENT NUMBER	IMPACT
INCREASE PERSON CARRYING CAPABILITY OF THE ROADWAY	
R-1	No increase in occupancy but took 950 buses out of general use lanes.
R-3	No increase in occupancy but took 780 HOV vehicles out of general use lanes.
R-4	No increase in occupancy but took 610 HOV vehicles out of general use lanes.
R-5	Increased occupancy from 1.83 to 2.07 persons per vehicle.
INCREASE BUS TRANSIT USE	
R-1	No increase.
R-5	Actually decreased from 40% in 1970 to 34% in 1984 of roadway users.
INCREASE BUS TRANSIT RELIABILITY	
R-1	Increased reliability dramatically but no hard data.
INCREASE CARPOOLING AND VANPOOLING	
R-5	Increased carpools from 4.8% (1100 of 4970 vehicles) in 1970 to 19.5% (4970 of 25,530 vehicles) in 1984.
REDUCE THE NEED FOR FUTURE EXPANSION OF THE ROADWAY	
R-1	Due to the elimination of 950 bus trips, it is estimated that an additional six years would be needed for the roadway to reach capacity.
R-3	Due to the elimination of 780 vehicle trips, it is estimated that an additional five years would be needed for the roadway to reach capacity.
R-4	Due to the elimination of 610 vehicle trips, it is estimated that an additional four years would be required for the roadway to reach capacity.
R-5	Due to the increase in occupancy and the elimination of vehicle trips, it is estimated that an additional four years would be required for the roadway to reach capacity.

TREATMENT R - TOLL FACILITY PREFERENTIAL LANE (CONT'D)

TREATMENT NUMBER	IMPACT
REDUCE FUTURE CAPITAL COSTS FOR NEW CONSTRUCTION	
	(NOTE - assume a lane costs $500,000/mile in today's dollars.)
R-1	Save approximately $525,000.
R-3	Save approximately $275,000.
R-4	Save approximately $90,000.
R-5	Save approximately $60,000.
REDUCE AUTO USE ON THE ROADWAY	
	Same as Impact 1.
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
R-1 & R-5	HOVs save 10 minutes.
R-3 & R-4	HOVs save up to 20 minutes.
INCREASE DELAYS FOR NON-HOVS	
R-1	No adverse effect on Non-HOVs.
INCREASE GOVERNMENT'S OPERATING COSTS	
R-1	Operating costs are $200,000 per year.
R-3	Operating costs are $150,000 per year.
R-5	Operating costs are $2,300 per month.
INCREASE ACCIDENTS INITIALLY	
R-1	No increase.

TREATMENT S: SIGNAL PREEMPTION

	S-1	S-2	S-3
LOCATION	Frankford Avenue, Philadelphia, Pennsylvania	Wisconsin Avenue, Washington, D. C.	2nd & Marquette Avenues, Minneapolis, Minnesota
YEAR IMPLEMENTED	1981	1974	1978
LENGTH/SIZE	6.3 miles		
NUMBER OF LANES	43 intersections	30 intersections	23 intersections
PRIORITY CUTOFF	Buses	Buses	Buses and Commercial Vehicles
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operation suspended in 1976	operational
VIOLATIONS			
COMMENTS	Trolley cars, detector on wire. Keeps % of green time the same overall.	Operation suspended due to problems with signal timing. Long delays caused by system.	Detectors in roadbed.

TREATMENT S: SIGNAL PREEMPTION (cont'd)

	S-4 2nd and 3rd Streets, Louisville, Kentucky	S-5 NW 7th Avenue, Miami, Florida	S-6 104th Avenue at I-25, Denver, Colorado
LOCATION			
YEAR IMPLEMENTED	1972	1974	1978
LENGTH/SIZE			
NUMBER OF LANES	8 intersections	35 intersections	1 intersection
PRIORITY CUTOFF	Buses	Buses	Buses
HOURS OF OPERATION	7 - 9 am 4 - 6 pm	24 hours	24 hours
CURRENT STATUS	operational	operation suspended in 1976	operational
VIOLATIONS			
COMMENTS		Operation suspended when I-95 concurrent flow lane opened (N-7).	Signal gives buses own phase. Will probably be suspended when signal system is refurbished.

TREATMENT S: SIGNAL PREEMPTION (cont'd)

	S-7	S-8	S-9
LOCATION	Simms Street at 6th Ave. Freeway, Denver, Colorado	Popular Avenue, Memphis, Tennessee	Westheimer & Richmond Avenues, Houston, Texas
YEAR IMPLEMENTED	1979	1979	1981
LENGTH/SIZE			
NUMBER OF LANES	1 intersection	26 intersections	18 intersections
PRIORITY CUTOFF	Buses	Buses	Buses
HOURS OF OPERATION	24 hours	24 hours	6 - 9 am 4 - 6 pm
CURRENT STATUS	operation suspended in 1985	operation suspended in 1982	operation suspended in 1983
VIOLATIONS			
COMMENTS	Signal gave buses own phase. Operation suspended because thought to be causing large delays to other traffic.	Express bus service ended in 1982, therefore no need for preemption.	Operation suspended due to high maintenance costs and few benefits.

TREATMENT S: SIGNAL PREEMPTION (cont'd)

	S-10	S-11	S-12
LOCATION	Greenback Lane, Sacramento, California	Willow Pass Road and Diamond Boulevard, Concord, California	Soquel Avenue, Santa Clara, California
YEAR IMPLEMENTED	1975	1975	1978
LENGTH/SIZE			
NUMBER OF LANES	12 intersections	12 intersections	4 intersections
PRIORITY CUTOFF	Buses	Buses	Buses
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operation suspended in 1980	operation suspended in 1980	operational
VIOLATIONS			
COMMENTS	Operation suspended due to doubling of volumes and buses getting delayed in traffic. Therefore, preemption couldn't work effectively.	Operation suspended because new signal system installed which alleviated congestion, therefore no need for preemption.	Large number of buses may sometimes cause side street traffic to experience delays due to shorten green time.

TREATMENT S: SIGNAL PREEMPTION (cont'd)

	S-13	S-14	S-15
LOCATION	Market, Sutter, Post, and O'Farrell Streets, San Francisco, California	Five streets, Santa Clara, California	Lemon and Gaston Avenue, Dallas, Texas
YEAR IMPLEMENTED	1979	1978	1977
LENGTH/SIZE			
NUMBER OF LANES		60 intersections	48 intersections
PRIORITY CUTOFF	Buses	Buses	Buses
HOURS OF OPERATION	24 hours	24 hours	24 hours
CURRENT STATUS	operational	operational	operation suspended in 1980
VIOLATIONS			
COMMENTS		int. Monterey Highway - 9 San Carlos St - 7 Almaden Expwy - 12 Lawrence Expwy - 18 Montague Expwy - 14 Data from Almaden Expressway. Deactivated at spots due to high bus volume and large delays to side street traffic.	Operation suspended due to large delays to side street traffic caused by reduced green time.

TREATMENT S: SIGNAL PREEMPTION (cont'd)

LOCATION	S-16 Marsalis Avenue, Dallas, Texas
YEAR IMPLEMENTED	1977
LENGTH/SIZE	
NUMBER OF LANES	14 intersections
PRIORITY CUTOFF	Buses
HOURS OF OPERATION	24 hours
CURRENT STATUS	operation suspended in 1980
VIOLATIONS	
COMMENTS	Same as S-15.

TREATMENT S - SIGNAL PREEMPTION

TREATMENT NUMBER	IMPACT
INCREASE BUS TRANSIT USE	
S-5	No bus service "before". During the morning peak 26 buses carried 673 passengers while during the evening peak, 27 buses carried 570 passengers.
S-11	Transit strike occurred during implementation and volumes were reduced because of it.
S-14	No change, 1200 passengers per day both "before" and "after."
INCREASE BUS TRANSIT RELIABILTY	
S-4 & S-11	An improvement but no numbers.
S-5	Decreased reliability as compared to progression of signals. May be due to drivers going at one speed during progression but varying speeds during preemption.
S-14	Without preemption, 68% of the buses met or bettered the minimum time while with preemption 100% of the buses met or bettered it.
REDUCE TRAVEL TIME FOR HOV USERS AND OVERALL	
S-1	Bus travel time reduced 15 to 20%.
S-2	Bus travel time reduced 10%.
S-4	During the morning peak the bus travel time was reduced 3% from 32.50 to 31.48 minutes, while during the evening peak the bus travel time was reduced 7% from 34.55 to 32.15 minutes.
S-5	During the morning peak, the bus travel time was reduced 10.6% from 26.3 to 23.5 minutes, while during the evening peak the bus travel time was reduced 20.5% from 29.7 to 23.6 minutes.
S-9	During the morning peak, the bus travel time was increased 23.8% from 14.3 to 17.9 minutes, while during the evening peak, the bus travel time was increased 5.6% from 19.5 to 20.6 minutes.
S-11	Bus travel time was reduced 9.5% from 31.5 to 28.5 minutes.
S-14	Bus travel time was reduced by 10.3%.

TREATMENT S - SIGNAL PREEMPTION (CONT'D)

TREATMENT NUMBER	IMPACT
INCREASE DELAYS FOR NON-HOVS	
S-4, S-11, & S-14	No significant change.
S-5	During the morning peak on 7th street, travel time was reduced 8.4% from 27.3 to 25.0, while during the evening peak, the travel time was reduced 15.7% from 29.9 to 25.7 minutes.
S-6	During the morning peak, the travel time for both the preemptive and the side street increased 22.1 % and 5.8% respectively, while during the evening peak, these travel times increased 29.3% and 10.1% respectively.
INCREASE TRANSIT'S OPERATING COSTS	
S-11	Due to reduced operating time, an annual savings of $22,000.
S-14	Due to travel time savings, could keep same headway and reduce 1 bus or keep 10 buses and reduce headway from 15 to 13.5 minutes.
INCREASE GOVERNMENT'S OPERATING COSTS	
S-5	Service call rate higher for preemptive signals than other signals but no dollar value.
S-15	Operational costs of $50,000 per year.

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