

❖ **CENTER FOR PRIVATE-PUBLIC SECTOR COOPERATION**

❖ **CENTER FOR THE IMPROVEMENT OF PUBLIC MANAGEMENT**

COURTESY PATROL PILOT PROGRAM

Prepared for the Colorado Dept. of Transportation

**by the University of Colorado's
Center for Public Private Sector Cooperation
working in conjunction with
The College of Engineering**

93-18

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16. Abstract The pilot courtesy patrol program for the I-25 corridor in Denver was initiated as a result of a recommendation from the Colorado Incident Management Coalition (CIMC). The purpose of the pilot program was to detect and remove disabled vehicles from the roadway quickly to avoid congestion backups. An independent technical evaluation of the pilot program was conducted by a consultant to evaluate the operation of the program and the impact that the program was having on reducing congestion. For further information on other recommendations of the CIMC, see the Recommendations of the Colorado Incident Management Coalition Task Force Report, September 1992. Implementation:			
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COURTESY PATROL PILOT PROGRAM

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Executive Summary

The Program Model

The Colorado Incident Management Coalition recommended establishment of a courtesy patrol program as one part of a broader incident management plan.¹

Incidents are random occurrences that cause reductions of roadway capacity or abnormal increases in demand. Incidents include (1) major accidents that tie up several lanes or entire freeways for hours, (2) minor accidents and stalled vehicles that block only one lane for short durations, (3) vehicles stopped on shoulders, (4) spilled loads, (5) construction, utility and maintenance activities and (6) special events that generate heavy traffic volumes.

Incidents are a major cause of congestion. Studies have shown that incidents -- vehicle breakdowns and accidents on or along the road -- account for as much as 60% of all congestion. Incidents cause congestion because they reduce road capacity below demand levels. Even small incidents on the shoulder have substantial impacts on capacity.

The longer the incident lasts, the greater the queuing and the greater the delays. The California Dept. of Transportation estimates that for each minute the time to clear blocked lanes is reduced, a motorist's delay is reduced by four or five minutes.

Typical Capacity Reduction	
Incident Type	Capacity Reduction (Percent)
Normal Flow (three lanes)	--
Stall (one lane blocked)	48%
Non-injury accident (One lane blocked)	50%
Accident (Two lanes blocked)	79%
Accident on shoulder	26%
Source: U.S. Dept. of Transportation, Freeway Incident Management Handbook, Report No. FHWA-SA-91-056, July 1991	

¹ All references are included in the main body of the report.

Congestion results in significant costs. Nationally, congestion on urban freeways is responsible for as much as 2 billion vehicle hours of delay and \$16 billion (when a dollar value is based on that time).

In addition, congestion contributes to:

- poor air quality;
- wasted fuel;
- secondary accidents.

The traditional approach for dealing with congestion -- adding capacity through new construction -- is increasingly difficult. This is due to several factors including:

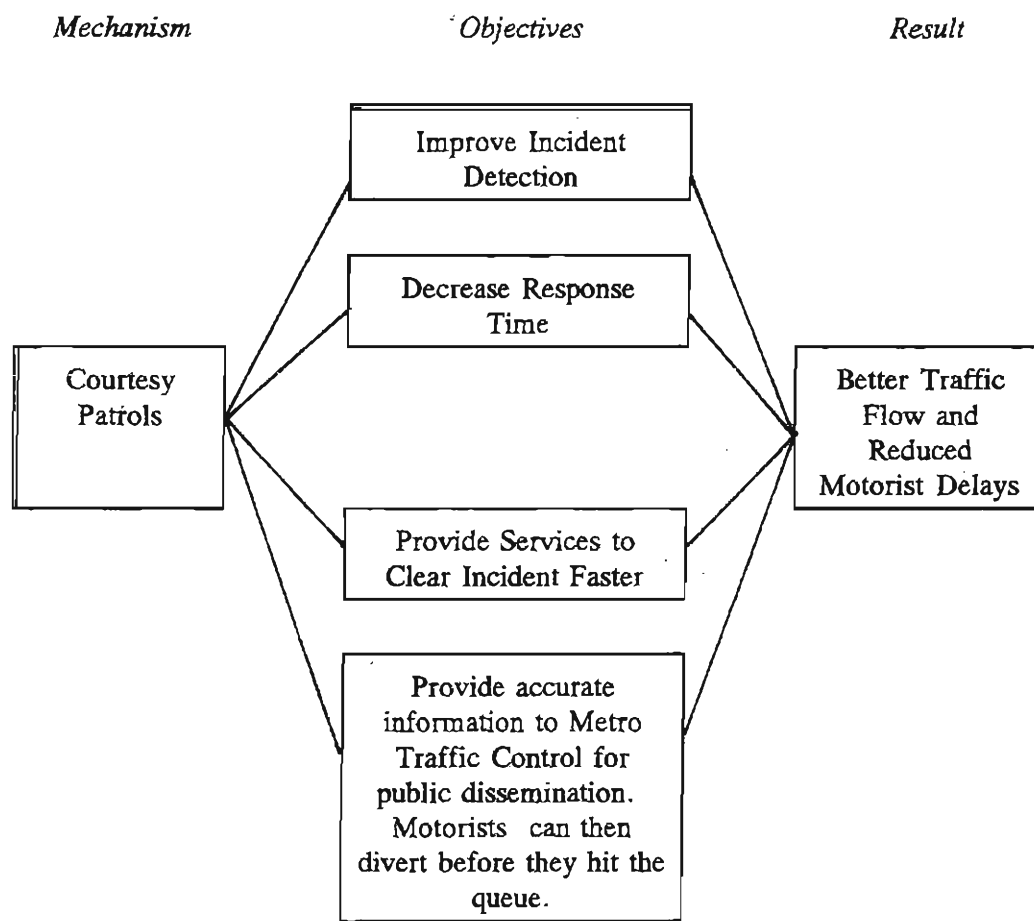
- high financial cost;
- political difficulty;
- ISTEA's limitations (the new federal law specifies that capacity additions are the last resort).

The courtesy patrol program represents an alternative approach for dealing with congestion. The program model is depicted in Figure 1.

Implemented on a pilot basis, the courtesy patrol program has been the subject of a comprehensive evaluation. The evaluation involves a team from the University of Colorado at Denver including staff from the Centers at the Graduate School of Public Affairs and the College of Engineering. The evaluation has five objectives:

1. Document how the program was implemented.
2. Document incident type and the level of service provided by the courtesy patrols.
3. Assess levels of motorist satisfaction with the program.
4. Compare alternative service delivery modes in terms of service provision and costs.
5. Assess impact on traffic conditions.

The Courtesy Patrol Program Model



Program Implementation

The Mile High Courtesy Patrol Program (MHCP) was implemented on a pilot basis in limited locations during rush hour only. The six month period which is the base for this evaluation ran from September 1992 through February 1993. The courtesy patrols operate on I-25 from County Line Road to 84th Avenue and on I-70 between Federal Boulevard and Washington Street. Six patrols cover 27 center lane miles -- 184 lane miles -- of roadway. Patrols are on the road from 6 A.M. to 9 A.M and from 3:30 P.M. to 6:30 P.M. weekdays.

The courtesy patrols provide a range of services designed to improve traffic flow and assist disabled motorists. The patrols:

- Detect incidents;
- Move vehicles out of the lane of traffic or off roadway;
- Provide services to motorists designed to get motorists moving including:
 - Provide gasoline;
 - Provide water for overheated vehicle;
 - Clear debris;
 - Fix flat tires;
 - Give directions.
- Tow disabled vehicles to safe sites off the freeway (if the patrol unit is equipped to do so) or call for emergency assistance;
- Provide information on traffic conditions to Metro Traffic Control for dissemination to the public.

Implementation of the courtesy patrol program required considerable cooperation among divisions within the Colorado Department of Transportation, among state agencies and local government jurisdictions, and between the public and private sectors.

Generally, the program was implemented smoothly and with few glitches. There were some objections by private tow truck companies who feared a loss of business. Some tow truck drivers harassed AAA-operated courtesy patrol operators. This led to double-teaming of the courtesy patrols for a period of time and loss of efficiency.

What Do We Know About Incidents?

Numerous incidents occur on the freeways, causing motorists to stop either on the shoulder or in a lane of traffic. The courtesy patrols reported 3,393 incidents between August 28 and February 26, 1993 -- an average of 28 per day during rush hours.

The courtesy patrols are equipped to respond immediately to several common problems: flat tires, running out of gas, and radiators overheating. These problems accounted for a little over a quarter of the total incidents reported. Other types of mechanical problems accounted for another third of incidents. Abandoned vehicles, a problem about which the courtesy patrols can do relatively little, accounted for 22% of incidents. These incidents are not included in any of the remaining analysis. Nine percent of reported incidents involved accidents affecting one or more vehicles.

Incidents are fairly evenly distributed by day of the week. On Mondays and Tuesdays there were slightly more incidents and on Thursday and Fridays slightly fewer. More than half the incidents (55%) occur during the afternoon rush hour. The imbalance between morning and evening is more pronounced during the latter half of the week.

The density of incidents (measured on a lane mile basis) is greatest on I-25 between the Alameda and Auraria Parkway exits. Other stretches with a high number of incidents per lane mile are County Line to Hampden and 38th Avenue to 58th Avenue.

In almost three quarters of the incidents reported, the vehicle was not in a lane of traffic. Most vehicles (63%) were found on the right shoulder. Some types of incidents were much more likely to involve a traffic lane than others. For example about half the accidents reported had a vehicle positioned in a traffic lane. Over a quarter of vehicles stopped due to a mechanical problem were in a traffic lane.

The courtesy patrols provide multiple services. For example, the patrol might push the vehicle out of the lane of traffic and then provide gasoline. Or it might protect the scene and then move debris off the roadway. All told, the courtesy patrols reported providing 2966 services to 2559 incidents, or an average of 1.16 services per incident.

The courtesy patrol will not provide direct services if the motorist does not wish to receive them. Service was refused in 14% of the cases. The usual reason for rejecting service was that the situation was under control or that help was already on the way.

The table below shows the proportion of incidents classified by problem type that receive different kinds of service.

Table 3-5 Percent of Cases Receiving Specified Service								
Percent Receiving:		Presenting Problem						
		Tire	Gas	Radiator	Misc Mech	Debris	Accident	Other
Service Directly Corresponding to Problem	36 %	72 %	81 %	51 %	20 %	87 %	na	na
Tow/Move	21 %	6 %	4 %	13 %	36 %	0 %	23 %	7 %
Protected Scene	16 %	6 %	5 %	4 %	12 %	24 %	66 %	19 %
Call for help	15 %	5 %	3 %	12 %	19 %	13 %	36 %	8 %
Other Service	13 %	10 %	7 %	18 %	12 %	2 %	9 %	48 %
Service Refused	14 %	10 %	7 %	20 %	17 %	2 %	4 %	26 %
Count of Incidents	2559	457	356	106	1122	45	280	193
Note: The same case can receive multiple services. The count of incidents may vary from table to table due to missing data.								

The courtesy patrol deals with most incidents quickly. Taking account of all incidents, the courtesy patrol took 1.1 minutes to respond once an incident was detected. The provision of services took 11.2 minutes on average. Just under a quarter of incidents required a tow or push from the courtesy patrol. All told, about one third of disabled vehicles received a tow or push from the courtesy patrol, a private tow service or both.

Overall, 80% of all incidents were judged "cleared" when the courtesy patrol left the scene.

Comparison of Alternative Service Delivery Approaches

The program is unique in that two different types of patrols are being evaluated, using different vehicles and personnel with different training. The American Automobile Association (AAA) operates the courtesy patrol on the southern segments of I-25 using specially marked tow trucks and its usual drivers. The Colorado State Patrol (CSP) operates the courtesy patrol on the northern stretches of I-25 and on I-70 using off-duty, but uniformed CSP officers operating four wheel drive vehicles equipped with push bumpers.

The intensity of deployment also differed. AAA fielded four patrol units responsible for 23.5 lane miles each. In contrast, the two CSP patrols were responsible for 44 lane miles each. CSP handled more incidents per patrol unit (though fewer per lane mile). With their smaller territory, AAA detected a greater proportion of incidents on their own through direct observation of the roadway. AAA's response time to detected incidents was also shorter.

The two different operators provided similar amounts of service to each incident, but AAA was more likely to move the disabled vehicle off the roadway. CSP and AAA-operated patrols provided an average of 1.16 services per incident. Disabled vehicles were more likely to be moved by AAA-operated courtesy patrols (24% vs. 16%). When tows by others are taken into account, a larger proportion of all disabled vehicles in both zones were moved but the differences between the zones were smaller. (37% vs. 32%).

AAA handled most types of incidents in a shorter time, but CSP had fewer service refusals and could handle accidents more effectively. CSP-operated patrols (staffed by uniformed law enforcement officers) had a lower refusal rate (12.5 vs. 14.3%). They were able to get vehicles involved in accidents moved more quickly than AAA. In almost all other types of incidents, AAA moved the vehicle more quickly and completed the provision of service in a shorter period of time. AAA rated a higher proportion of incidents "cleared."

CSP's cost per patrol unit are higher than AAA's -- \$38 per hour vs. \$29. They have lower equipment but higher labor costs. If courtesy patrol responsibilities led to higher FTE allocations for the state patrol and were built into regular assignments (as opposed to relying on overtime), then the two service delivery models would have virtually the same cost per hour.

Program Impacts

The courtesy patrol provides much-appreciated assistance to disabled motorists. Being stranded on the highway is a frightening and frustrating experience for motorists. They worry about safety -- both in terms of secondary accidents and the potential of becoming a crime victim. Motorists expressed gratitude and satisfaction for the services received from the courtesy patrol in the 550 comment cards returned to CDOT. Only three responded no to the question: "were you satisfied with the service you received?" Likewise, almost all -- 99% -- thought the courtesy patrol was a good use of their tax dollars.

The courtesy patrol has greatly improved incident detection capabilities. We are aware of many more incidents now than we were before. Metro Traffic Control knew of 4.5 incidents per day. With courtesy patrol, we are aware of 22 incidents per day (not counting abandoneds). Metro Traffic Control detected 1.9 incidents per day in the period after MHCP started patrolling; all remaining incidents were detected by MHCP in the course of patrolling.

The courtesy patrol has reduced the time it takes to respond and clear incidents. Before courtesy patrol, Metro Traffic Control's records indicate that it took an average of 23.4 minutes to clear an incident after first detection. For incidents blocking a lane of traffic, the average incident duration decreased by 10.5 minutes. For those not involving a traffic lane, the decrease was 8.6 minutes.

As a result of the courtesy patrol, there are fewer traffic delays attributable to incidents. Total vehicle delay caused by incidents depends heavily on the time duration of each incident; the traffic volume on the highway approaching the incident location during each incident and the number of blocked and unblocked lanes. Using a deterministic queuing model, we estimated the vehicle delay associated with incidents that occurred on the northbound lanes during the morning and evening rush hours on I-25 south of Colorado Blvd., where loop detectors yield reliable information on traffic volumes by time of day. A second estimate was done assuming the higher response/clearance time found to exist prior to MHCP operation.

Depending on the specific assumption made regarding lane closure effects of shoulder incidents, the model suggested a savings of between 78 and 98 vehicle hours of delay for

each incident served during the morning rush hour and a savings of between 71 and 75 hours per incident served during the evening rush hour.

The courtesy patrol yields very large benefits relative to its cost. The value of time saved by persons and goods due to better incident management depends on the average occupancies of passenger cars and transit vehicles, the wage earning impacts on those persons, and the value of goods in transit. A value of \$10 per vehicle hour is assumed.

Using this figure, it appears that the courtesy patrol saved motorists between \$1.8 and \$2 million in time over its six months of operation. In addition, disabled motorists received services of substantial value.

Table 7.1 Detail of Benefit/Cost Analysis		
	AM	PM
Number of Incidents - 6 months	1095*	1273*
Estimated Hours of Traffic Delay Averted Per Incident		
High	98	75
Low	78	71
Estimated Dollars Savings from Reduced Traffic Delay		
High	\$1,073,100	\$954,750
Low	\$854,100	\$903,830
Estimated Costs (6 patrols)	\$120,000 - \$168,000	
Benefit Cost Ratio		
High	16.9	
Low	10.5	

* These figures are low due to missing time data.

Since the courtesy patrol program costs approximately \$120,000 to operate over the same period, benefits exceed costs by a very substantial margin. Indeed the ratio of benefit to cost is as high as seventeen to one. The program was so successful that it was extended an additional six months. The cost increased to approximately \$168,000 to cover the actual operating costs. Even using conservative assumptions, benefits are more than ten times costs.

The evaluation results suggest it would be a wise use of dollars to establish the program on a permanent basis. CDOT should consider operating the patrols more hours as volumes are high during other parts of the day. It should also extend coverage to other stretches of highway approaching capacity conditions.

CHAPTER 1

Introduction

The Colorado Dept. of Transportation initiated a courtesy patrol program on a pilot basis in the summer of 1992. The Mile High Courtesy Patrol Program (MHCP) provides an alternative approach to incident management on major roadways during rush hour periods with the goal of reducing congestion. An incident is defined as "any non-recurrent event which causes reduction of roadway capacity. . ."¹ Incident management are those activities involved in detecting, responding to and clearing incidents. The courtesy patrol program is evaluated in this report.

The University of Colorado's Center for Public-Private Sector Cooperation, working in conjunction with the University's College of Engineering, was hired in June 1992 to evaluate the courtesy patrol program.

Since the courtesy patrol is established on a pilot basis only, evaluation is a critical task. CDOT set general specifications for the evaluation, issued an RFP and selected a contractor to complete the task. In a series of meetings with the project steering committee, CDOT and the evaluators then developed procedures for data collection and reporting.

The evaluation has five objectives:

1. Document how the program was implemented.
2. Document incident type and the type of service provided by the courtesy patrols.
3. Assess levels of motorist satisfaction with the program.
4. Compare alternative service delivery modes.
5. Assess impact on traffic conditions.

First, the model is documented, relying on program planning reports, service contracts and

¹U.S. Dept. of Transportation, **Freeway Incident Management Handbook**, FHWA-SA-91-056, July 1991. Note the full definition incorporates non-recurrent events that produce an abnormal increase in demand such as major sports events.

interviews. Then implementation is described based on participation in steering committee meetings, interviews with program personnel at all levels, and observation of service delivery. Program evaluations typically document the actual approach to service delivery because actual practice sometimes departs from the model underlying the program. Policies have been judged ineffective, at times, when the problem was not the policy but rather how it was put in practice. The process analysis is included in Chapter 2.

The second major evaluation task is to document incidents and the services provided by the courtesy patrols. To accomplish this, the evaluators developed a data collection form that was filled out by the courtesy patrol operator before leaving the incident scene. A copy of the form is included as Appendix I. The data have been entered into the computer and analyzed using SPSS-X (The Statistical Package for the Social Sciences). The analyses of incidents and of services provided by the courtesy patrols is included in Chapter 3.

A third evaluation task involves a comparison of service delivery modes -- The American Automobile Association (AAA) using tow trucks and the Colorado State Patrol (CSP) using four wheel drive vehicles equipped with push bumpers. This analysis is in Chapter 4.

The fourth evaluation task is to assess motorist satisfaction. All motorists assisted by the program were handed a brochure describing the program which included a pre-stamped, mail-in comment card. They were asked to return the card by mail. The analysis of comment cards returned by motorists is included in Chapter 5.

The final evaluation task involves an assessment of the program's impact on traffic flows. This is reported in Chapter 6. The impact analysis involved several steps. First, data on incidents and times required to clear them were collected from Metro Traffic Control in the months prior to program implementation. This data is then contrasted with experience after the courtesy patrol started operations to determine improvements in the time it takes to clear incidents.

Second, the evaluation draws on data on traffic counts, densities and speeds recorded each day at the ramp metering stations at 9 interchange locations in the northbound direction of I-25 from County Line Road to Colorado Blvd.

Finally, standard traffic modeling techniques are used to assess the benefits associated with observed improvements in response time, given road and traffic conditions.

Chapter 7 includes final observations and recommendations.

CHAPTER 2

What Does it Take To Put Together a Courtesy Patrol Program?

This chapter focuses on the implementation of the courtesy patrol Program. It starts by looking at the reasons for initiating a courtesy patrol. Then it describes the program model and the approach taken to implementation including resources needed for operation, the assignment of roles and responsibilities, program costs, funding sources, and problems encountered in the program.

Why Initiate A Courtesy Patrol Program?

The passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) changes the legal framework within which state highway agencies operate. The new law emphasizes the need for more efficient use of existing roadways. It makes it much more difficult to engage in construction activities and encourages states to develop alternative approaches for dealing with congestion. The challenge is particularly great in "non-attainment areas" such as Denver -- areas that are out of compliance with national air quality standards.

Congestion is an increasingly serious problem on urban roadways. As roads become more congested, travel speeds decrease and trip times increase. Nationally, congestion on urban freeways is responsible for as much as 2 billion vehicle hours of delay and \$16 billion in costs (when a dollar value is based on that time)². In addition, congestion contributes to poor air quality, wasted fuel, and accidents.

While some amount of congestion stems simply from traffic volumes exceeding roadway capacity, studies have shown that incidents -- vehicle breakdowns and accidents on or along the road -- account for as much as 60% of all congestion. Incidents include (1) major accidents that tie up several lanes or entire freeways for hours, (2) minor accidents and stalled vehicles that block only one lane for short durations, (3) vehicles stopped on

² Jeffrey A. Lindley, "Quantification of Urban Freeway Congestion and Analysis of Remedial Measures", Federal Highway Administration Staff Report RD-87/052, October 1986. Cited in Cambridge Systematics, *Incident Management*, Alexandria, Virginia: Trucking Research Institute, October 1990

shoulders, (4) spilled loads, (5) construction, utility and maintenance activities and (6) special events that generate heavy traffic volumes.³

According to a Federal Highway Administration report, incidents blocking one lane of a three lane road will reduce capacity by almost half. (See table 2.1) Even an incident on the shoulder, not physically blocking a lane, such as a stalled vehicle or a law enforcement stop, can cause a 25% capacity reduction. Capacity reductions occur even when lanes are not blocked due to the "gawking" effect -- that is the effect caused by drivers slowing to observe the incident.

The faster an incident can be cleared from the roadway, the less the impact on traffic flows. The California Dept. of Transportation estimates that for each minute the time to clear blocked lanes is reduced, a motorist's delay is reduced by four to five minutes.⁴

How quickly vehicles are moved off the roadway depends on a number of factors including how fast an incident is detected, how quickly help arrives, the motorists response to an offer of service, the time it takes to provide the service, and the legal framework that governs vehicles disabled along the roadway.

Table 2.1 Typical Capacity Reduction	
Incident Type	Capacity Reduction (Percent)
Normal Flow (three lanes)	--
Stall (one lane blocked)	48%
Non-injury accident (One lane blocked)	50%
Accident (Two lanes blocked)	79%
Accident on shoulder	26%
Source: U.S. Dept. of Transportation, Freeway Incident Management Handbook, Report No. FHWA-SA-91-056, July 1991	

³ U.S. Dept. of Transportation, Freeway Incident Management Handbook, FHWA-SA-91-056, July 1991.

⁴ David Roper, Freeway Incident Management, National Cooperative Highway Research Program, NCHRP Project 20-5, Topic 18-08. Cited in Robert A. Reiss and Walter M. Dunn Jr., Freeway Incident Management Handbook, U.S. federal Highway Administration, Report No. FHWA-SA-91-056, July 1991. p.2

Program History

In 1991, the Colorado Incident Management Coalition (CIMC) was created to recommend alternative strategies to address the problems caused by "incidents" in the Denver metropolitan area. The coalition believed that what was learned to work effectively in Denver could then be applied in other areas throughout the state.

The CIMC is a multi agency, multi disciplinary group comprised of members representing a wide variety of agencies and corporations. All are involved in traffic management or incident response. The CIMC was formed after an Incident Management Conference was sponsored by CDOT in cooperation with the National Incident Management Coalition (NIMC).

The CIMC reviewed available information on the functioning of the freeway and arterial roadway network in the Denver area. It found that substantial parts of the system were experiencing severe traffic congestion in the morning and evening rush hours and that the problem would likely get worse. Figures 2.1 and 2.2 indicate freeways and arterials that are congested. Vehicle miles travelled in the Denver metro area are projected to increase from the current 34 million to 65 million in 2010.⁵

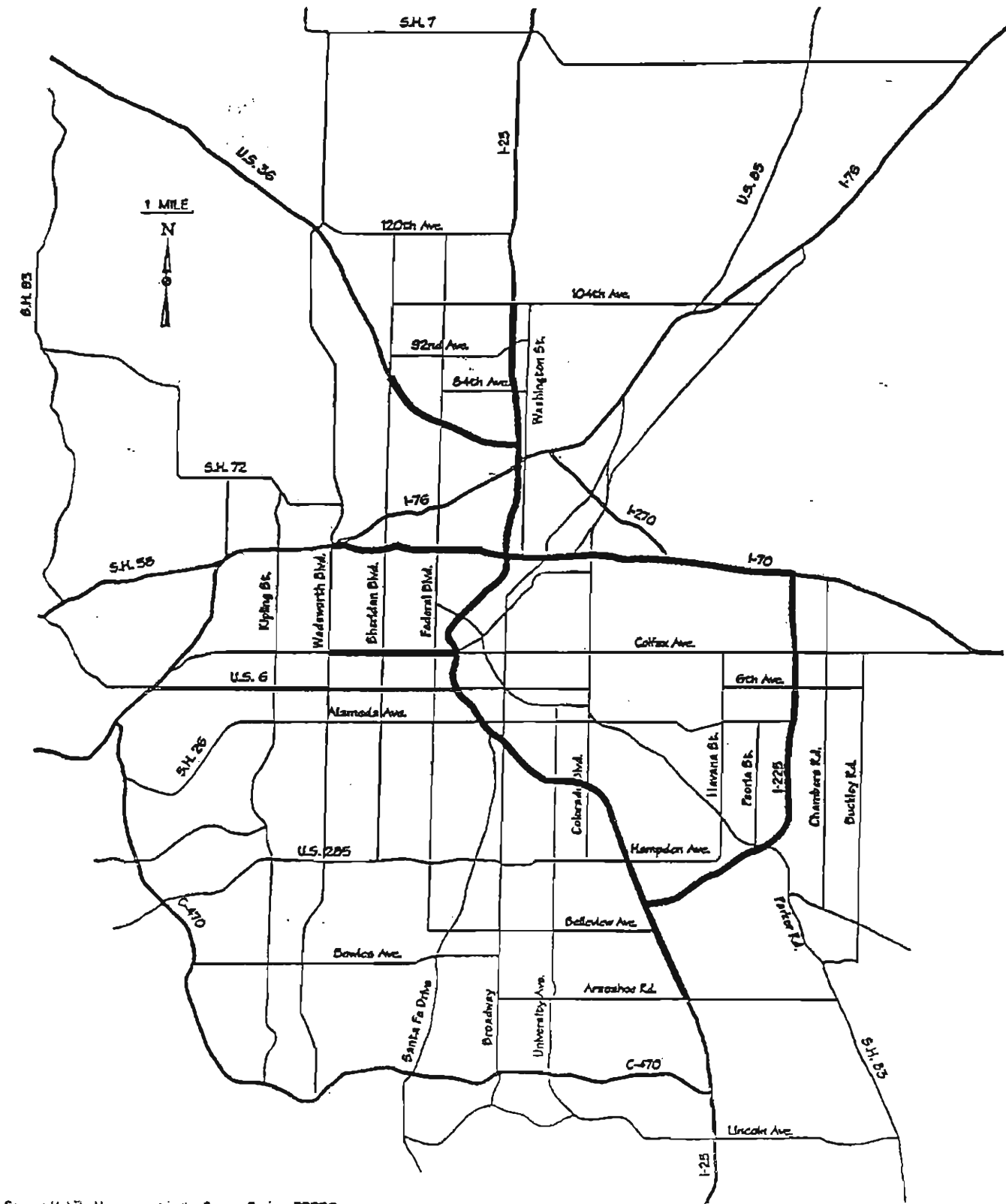
Options for expanding capacity are somewhat limited. It is costly and politically difficult to add lanes to the existing freeways. The network of freeways and arterials in Denver does not offer alternative uncongested routes capable of handling high volumes of traffic. The CIMC concluded that given capacity and volume considerations, incident management represents an important strategy for improving traffic flows, reducing congestion and motorist delays. In an area where air pollution is a serious issue, the need for this kind of strategy is heightened.

The CIMC recommended a comprehensive incident management program to reduce incident detection and verification time, reduce incident response time, reduce incident clearance time, develop effective incident scene management, and provide timely and accurate information to motorists.⁶ It envisioned a full traffic management operation with multiple dimensions. Such a system would require continual flows of information concerning volume, speed, accident information and lane closures to a Traffic Operations Center (TOC). The TOC, in turn, could relay information to motorists via roadside variable message signs or via radio so they can adjust their schedule and/or select alternative routes. Implementation of the full strategy would also involve a number of changes in law and a range of cooperative agreements among jurisdictions.

⁵ Denver Regional Council of Governments, **Mobility Management in the Denver Region**

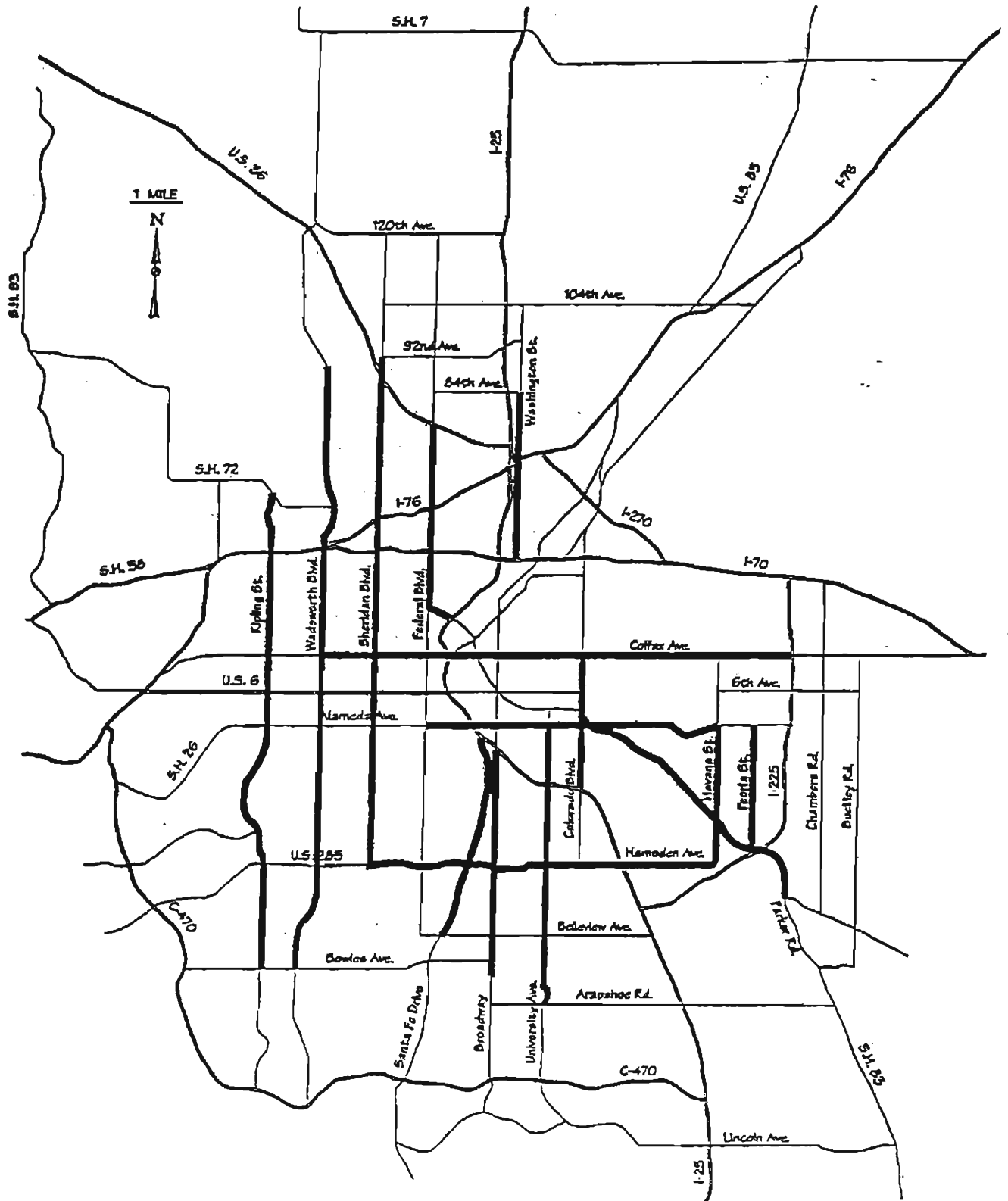
⁶ Recommendations of the Colorado Incident Management Coalition, September 1992

Figure 2.1 Congested FREEWAY Corridors in 1990



Source: Mobility Management in the Denver Region, DRCOG

Figure 2.2 Congested ARTERIAL Corridors in 1990



Source: Mobility Management in the Denver Region, DRACO

A comprehensive incident management program takes time and money to implement and involves creation of a new high technology infrastructure involving electronic and communications equipment. One part of the system can stand alone, however and be implemented in the short term -- a courtesy patrol program. Hence it is one of the first of CIMC's recommendations to be implemented by the Colorado Dept. of Transportation. CDOT moved quickly to establish a courtesy patrol program on a pilot basis, to learn more about numbers and types of incidents, and the effects on delays of this strategy for incident clearance. The pilot program is the subject of this evaluation.

Program Approach

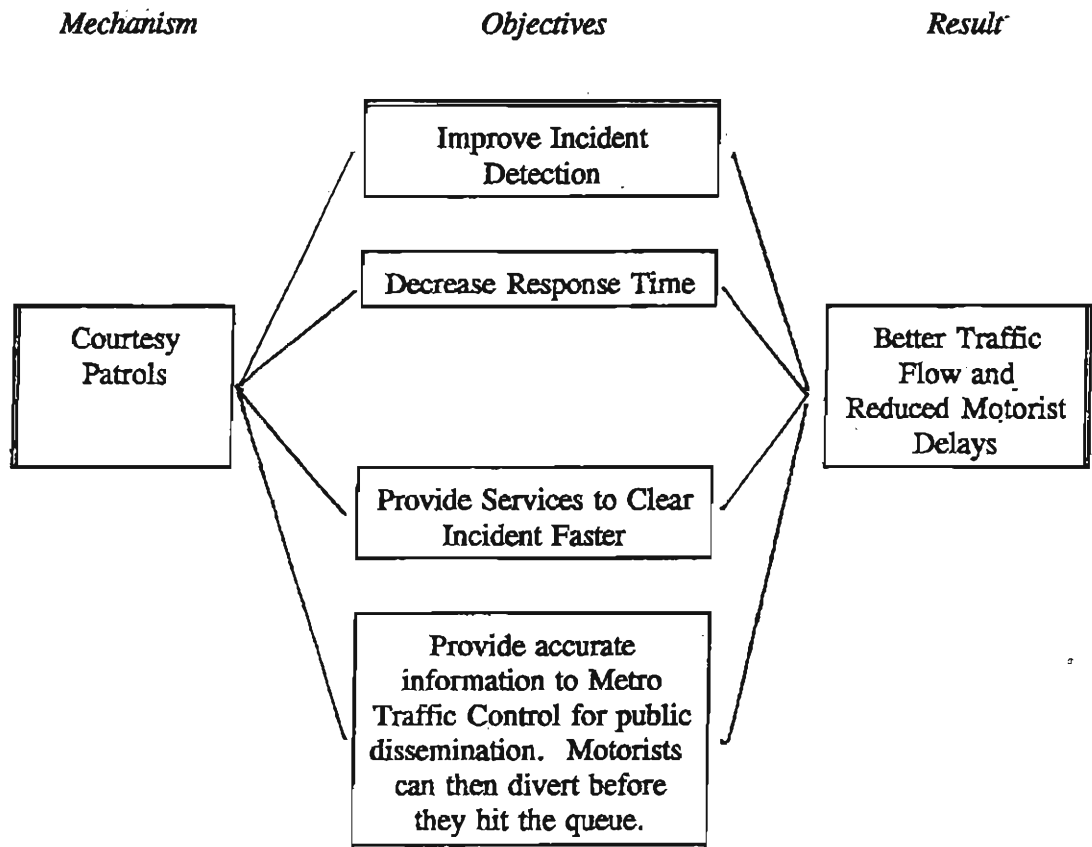
As described in the September, 1992 CIMC recommendations report, incident management is one tool that can be used to mitigate traffic congestion resulting from incidents on freeways. "Freeway incident management is the coordinated, preplanned use of human, institutional and mechanical resources to reduce the duration and the impact of incidents. It involves a systematic process to reduce the time to detect and verify that an incident has occurred, initiate the appropriate response, clear the incident, communicate with motorists to reduce demand or divert traffic, and manage traffic until full capacity is restored."⁷

The courtesy patrol -- one form of incident management is intended to do the following:

- Detect incidents
- Move vehicles out of the lane of traffic or off roadway
- Provide services to motorists designed to get motorists moving including:
 - Provide gasoline
 - Provide water for overheated vehicle
 - Jump start vehicles
 - Debris clearance
 - Fix flat tire
 - Give directions
- Call for emergency assistance on incidents that can't be handled by the courtesy patrol unit.
- Provide information on traffic conditions to Metro Traffic Control for dissemination to the public.

⁷ Recommendations of the Colorado Incident Management Coalition, p. 10

Figure 2.3
The Courtesy Patrol Program Model



Interagency and Interjurisdictional Cooperation

The courtesy patrol pilot program was implemented in a complex environment. To put the program together, numerous interests and groups were brought together including: several divisions within CDOT, AAA, the Colorado State Patrol and other law enforcement agencies, Metro Traffic Control, the sky patrol, various media organizations, and private business interests. General design issues and arrangements for cooperation and coordination were worked out with the Incident Management Coalition and by the Steering committee. But specific negotiation of roles and responsibilities, and the working out of program details was the responsibility of CDOT administrators.

- Within CDOT, the program involved the Division of Transportation

Development Research Branch, Region 6's Traffic Operations office and the Office of Transportation Safety. Contributions of money, expertise, and equipment were provided.

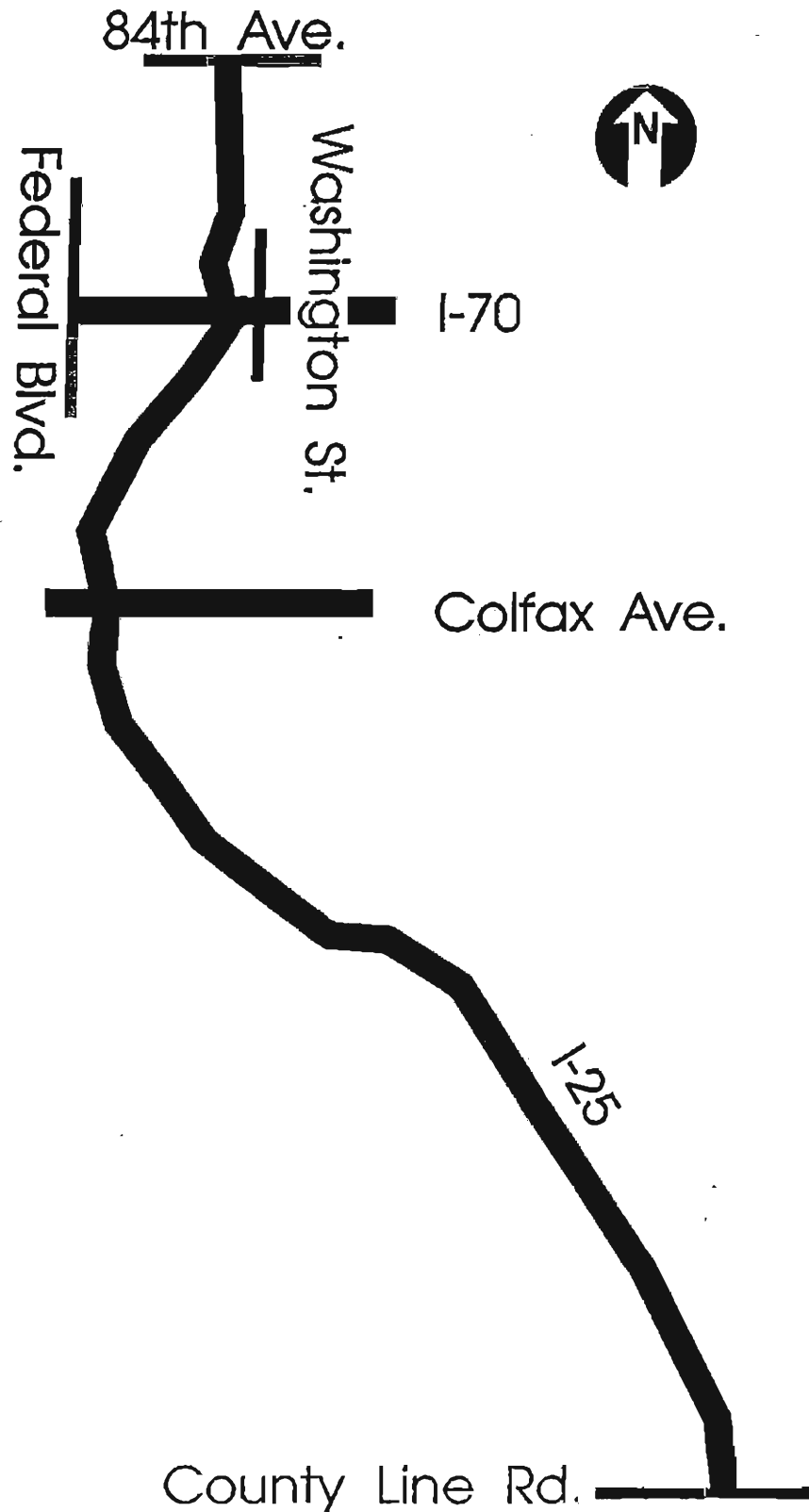
- An Inter-Agency Agreement was signed between CDOT and the Colorado State Patrol (CSP) to implement the courtesy patrol program. A sole source third-party contract was signed with AAA due to their unique qualifications to meet the goals and objectives of the program. AAA had demonstrated commitment through its active participation on and contribution to the Colorado Incident Management Coalition. It maintains a large fleet, a sophisticated tracking system, and an established communications link with Metro Traffic Control. Finally it has a good reputation for providing service.
- Cooperative relationships were established with Metro Traffic Control, various media organizations and sky-based traffic observers. As discussed further below, these organizations play a role in incident detection and in communicating to the broader public regarding traffic conditions.
- The program required coordination with the Denver Police Dept., which has responsibility for traffic law enforcement and emergency response on the portions of roadway served by the courtesy patrol within Denver city limits.
- Various private businesses were involved in program planning. For example, taxi companies were involved in program planning so if a disabled vehicle had too many occupants to ride with the tow truck, alternative arrangements could be made for transport. Also, as will be discussed later, various private businesses agreed to allow their parking lots to be used as "safe havens" for disabled vehicles moved by the AAA from the interstate.

Resources

During each rush hour period -- 6 A.M. - 9 A.M. and 3:30 - 6:30 P.M. weekdays (excluding holidays), six courtesy patrols are operating. They cover approximately 27 miles of interstate along I-25, and a short stretch of I-70 near where it intersects I-25. See Figure 2.4. These corridors were chosen because of high needs. They have high traffic volume, some flow difficulties attributable to changes in road geometry (e.g. shift in numbers of lanes) or lack of shoulder and temporary difficulties due to extensive construction along the northern portion of I-25.

Vehicles: Two types of vehicles are used by the courtesy patrol. CDOT's contract with AAA calls on it to use Class A tow trucks that are painted red. CDOT has supplied AAA with removable magnetic courtesy patrol signs which are mounted on the doors of the patrol vehicles. Identifying marks have also been placed on patrol vehicle roofs to facilitate

Figure 2.4 Colorado Courtesy Patrol Service Boundaries



identification by airborne traffic reports. AAA is also required to have one spare vehicle available for the patrol, that meets the specifications of regular courtesy patrol vehicles.

The contract with the Colorado State Patrol requires the use of two four wheel drives vehicles that are a part of the CSP fleet. These vehicles are equipped with heavy push bumpers, which allow it to push most types of vehicles for short distances. CDOT has supplied CSP with removable magnetic courtesy patrol signs which are mounted on the doors and roof of the patrol cars. Both AAA and CSP vehicles are used for regular business when not being utilized for the courtesy patrols.

Staffing: Each MHCP vehicle is staffed six hours per day, five days a week (three hours in the morning and three hours in the evening). This poses a staffing challenge, which is handled differently by AAA and CSP.

The CSP staffs the courtesy patrol with off-duty officers who volunteer to work on an over-time basis (getting paid time and a half). Officers either add a three hour MHCP shift at the beginning or end of a regular work day or they work one or more shifts on their days off. Currently 18 officers have volunteered for the courtesy patrol.

AAA staffs the courtesy patrol with regular AAA drivers who have volunteered to participate in the pilot project. Their work week is structured, however, so that MHCP substitutes for other work. Drivers work three twelve hour days, splitting their time between MHCP (during rush hours) and regular AAA duties (during the middle of the day). Ten AAA drivers have assumed courtesy patrol responsibilities.

Patrol operators are acquainted with MHCP procedures and responsibilities, but other than that receive no special training. State patrol officers receive basic life support training, such as CPR and First Aid as part of the CSP new officer program. AAA, as part of its normal hiring, requires its drivers to take a 2-day training course which includes defensive driving, drivers' education, general mechanical training (such as changing a flat tire, jump starting a vehicle and diagnosing problems on the scene).

Administrative responsibility for the program lies with CDOT staff. No new staff were hired; rather existing staff in CDOT's Region 6 Traffic Operations Office and the Division of Transportation Development located at CDOT Headquarters have added the courtesy patrol to their regular responsibilities.

In addition, representatives from CSP, CDOT, FHWA, AAA, Metro Traffic Control, and KHOW radio participate on the steering committee, devoting time to monitoring program implementation and working out problems as they arise.

Deployment: The CSP and AAA are responsible for operating the courtesy patrol to assist disabled vehicles that are blocking lanes of traffic or are on the shoulder of the roadway. The CSP operates this service both in the northbound and southbound lanes of I-25 from

The CSP operates this service both in the northbound and southbound lanes of I-25 from Colfax Avenue north to 84th Avenue and in the eastbound and westbound lanes of I-70 from Federal Boulevard to Washington Street. Two vehicles are deployed at the same time, one heading southbound and the other northbound. Once on the road no procedures are in place to re-route patrol vehicles if they are "stacking up" on the roadway.

AAA operates the service in the northbound and southbound lanes of I-25 from Colfax Avenue south to County Line Road. AAA has split this segment into two patrols. Each patrol consists of two tow trucks. One patrol covers County Line Road to Colorado Boulevard. The other covers Colorado Boulevard to Colfax Avenue. Again, no mechanisms exist for ensuring that appropriate spacing between vehicles is maintained over the course of the shift.

Roles and Responsibilities of AAA and CSP Staff

courtesy patrol drivers are responsible for patrolling a designated segment of roadway. They respond to incidents which they detect in the course of patrolling or are reported to them by Metro Traffic Control or other outside sources.

If the driver is with the disabled vehicle, the courtesy patrol explains who they are, what they can do and that the service is provided free of charge. The patrol operator hands out a copy of a brochure further explaining the program. (See appendix) The courtesy patrols are to try to provide the required service in a ten minute timeframe. If the vehicle is in the lane of traffic, the first priority is to move it so that traffic can move freely. "Hook'em and book'em!" explains the AAA manager. In the case of CSP, this generally means pushing the vehicle to the side of the road. AAA will use its tow truck to move the vehicle to a designated safe site off the freeway.

After the disabled vehicle is moved out of the lane of traffic, or if it is on the shoulder when first detected, the courtesy patrol will attempt to provide the services needed for the vehicle to go on its way. The courtesy patrol can provide a gallon of gasoline, water for an overheated radiator, or assistance in fixing a flat tire. Occasionally, other minor mechanical problems can be identified or fixed.

If direct assistance cannot be provided, the courtesy patrol will assist in making arrangements for other help. This may involve the use of a cellular phone to make a call or in the case of AAA-operated courtesy patrols, towing the vehicle to a safe site. Safe sites have been identified by AAA for the southern segment of the courtesy patrol. Safe sites consist of service stations and other automobile related businesses located close to the freeway. These businesses have been contacted by AAA and have agreed to participate in the courtesy patrol program. These businesses can provide services, or, if the motorist prefers to go elsewhere, these businesses will assist in making arrangements. Safe sites have not been identified in the northern segment which is patrolled by the CSP, since CSP does not have the capacity to tow vehicles to such sites.

The disposition of abandoned vehicles is more complex. The courtesy patrol can do relatively little about abandoned vehicles. Depending upon the road segment, either state or city law governs. In both instances, if the vehicle is blocking traffic, a law enforcement officer can order it to be towed immediately. If the abandoned vehicle is not blocking traffic, however, it may remain along the road for a period of time. In Denver, the driver has 3 hours from the time a vehicle is tagged by a law enforcement officer. On other portions of the interstate, state law governs. If a motorist leaves a note saying the vehicle is disabled and contacts state patrol, it can remain on the interstate for up to 72 hours. If no note is left, the vehicle can be towed after 24 hours. In either case, the time is calculated from the time a law enforcement officer tags the vehicle. A law enforcement officer can order a tow for any car left beyond the designated time. Inside Denver, the tow would be done by a private company operating under contract to the police dept. Outside of city limits, CSP would call a private tow, based on a rotation among qualified firms.

Whenever the courtesy patrol observes an abandoned vehicle, it completes a form for tracking purposes. If the vehicle is obstructing traffic, an AAA-operated courtesy patrol will notify law enforcement officials and move the vehicle if directed to do so. A CSP-operated courtesy patrol may simply take steps to move the vehicle.

If the abandoned vehicle is not obstructing traffic, an AAA courtesy patrol operator will leave a brochure describing the courtesy patrol program, indicating the type of help that would have been available had the driver remained with the vehicle (see appendix). A courtesy patrol manned by a Colorado State Patrol officer will "tag" a vehicle if it is outside Denver city limits (since on that portion of roadway CSP is the responsible law enforcement agency). If the vehicle is inside Denver, a CSP-manned courtesy patrol will respond in the same way as an AAA-manned courtesy patrol.

If the courtesy patrol detects an accident, it will call for appropriate assistance, including emergency medical help, law enforcement officers, etc. It generally will protect the scene, direct traffic and provide other assistance, as requested by law enforcement officers or at their own discretion.

In instances where debris is on the road, the courtesy patrol has the option of removing it if it can do so safely or of calling CDOT's maintenance crew for assistance. The courtesy patrol will protect the scene so that accidents can be avoided.

The courtesy patrol drivers complete a form describing the problem and the service provided for all incidents. Whenever a service is rendered to a motorist, they distribute a brochure (in English or Spanish as appropriate) and ask the motorist to complete a mail-in card assessing the service.

AAA developed a Standard Operating Procedures Manual for the courtesy patrol, and all courtesy patrol drivers are required to read and acknowledge the information contained in the manual. This manual is supplemental to AAA's Daily Operating Procedures Manual.

CSP briefed its officers about the courtesy patrol and the responsibilities expected of the officers while on patrol. The CSP supervisor provides fewer instructions since the job of the courtesy patrol includes many of the same aspects as the regular state patrol.

Supervisors at CSP and AAA are responsible for coordinating driving assignments to cover the courtesy patrol shifts, assuring that the courtesy patrol vehicles are equipped and maintained and that appropriate records are kept.

Communications Network

Effective communications are an important component of the courtesy patrol program. Information flows in several ways. First, the courtesy patrol communicates with Metro Traffic Control. Information flows to the courtesy patrol whenever Metro Traffic Control learns of an incident either from airborne traffic reporters or police reports.

Information flows *from* the courtesy patrol as well. The courtesy patrol is an important extension of Metro Traffic Control's data gathering ability. It can relay information on traffic speeds, incidents etc. Metro Traffic Control, in turn, passes the information to the public so that they can adjust their driving schedule or route in response to developing traffic conditions. This link is provided by Metro Traffic Control through its relationship with area radio and television stations.

A variety of telecommunications technologies are used by the MHCP. Both radios and cellular phones are used. Communications work somewhat differently on the northern and southern segments. In the north, where CSP operates the courtesy patrol, the operators keep in touch with the regular state patrol dispatcher using stationery radios. Portable radios are used to connect with Metro Traffic Control and State Base.

State Base was established to monitor traffic on the I-25 highway construction project which runs from 6th Avenue to 104th Avenue. The primary concern of State Base is construction management. Approximately 80 vehicles are equipped with radios which may be on this stretch of I-25 at any given time. Drivers of these vehicles include construction contractors, CDOT employees and contractors, including construction and traffic control inspectors.

State Base provides supplemental incident information for the courtesy patrol operators. Likewise, if the courtesy patrol observes something pertinent to the construction operation, it reports directly to state base. State Base is used only in the north segment of I-25, but it has capacity for expansion and could cover the entire Metro area.

The southern segment of the MHCP is covered by AAA. AAA's courtesy patrol vehicles do not communicate with Metro Base directly. Rather, their stationary vehicle radios are connected directly to an AAA dispatcher and all communication between Metro Base and the courtesy patrol flows through the AAA dispatcher.

In addition to radio communications, all courtesy patrol vehicles are equipped with cellular phones. The phones are not used for communication regarding incident detection and traffic flow. Rather, they are used to assist motorists involved in incidents. For example, motorists may notify employers or family about the incident. Or they may call for outside assistance if courtesy patrol service is not accepted.

Public Relations

In order for the program to work, motorists must be made aware of the service so they can respond appropriately if their vehicles become disabled. CDOT prepared brochures, held several press conferences and took other steps to publicize the program. Radio traffic reporters and Metro Traffic Control have been helpful in this regard through positive broadcasts about the effectiveness and efficiency of the courtesy patrol.

Program Financing

Costs: The day-to-day cost of operating the courtesy patrol, not counting CDOT's administrative costs or the evaluation, is estimated to be \$117,000 for six months. This translates into \$950 per day or \$20 per mile of roadway patrolled each rush hour.

The average cost per courtesy patrol per month (including driver and vehicle) is \$3,250. As will be discussed later, this cost varies depending on the delivery mode (CSP vs. AAA). It also reflects projections of costs as they were written into contracts rather than the actual cost of delivery, which appears to be somewhat higher (see Chapter 5).

Funding: The MHCP is funded using federal and state dollars. A portion of the funding is provided from highway research funding and a portion is provided from highway construction funding. These funding sources cannot be used to maintain the program on a permanent basis. Whether other department funds can be found to maintain the program depends on the results of the evaluation, the priority assigned to the program and the urgency of projects competing for resources.

Implementation Issues

Generally speaking, program implementation proceeded smoothly. Only a couple of issues surfaced over the course of the program.

First, some private independent tow companies disapproved of the courtesy patrols, fearing they would take away part of their business base. A number of independent tow drivers showed up at the kick-off press conference to protest and again, rallied in protest in

December. Some independent tow drivers further expressed their opposition to the program by harassing AAA-operated courtesy patrols. The harassment included obscene hand gestures, verbal abuse, and even death threats. In addition, some AAA-manned courtesy patrols have been "boxed-in" on the highway by several independent tow trucks, in an effort to deter them from providing service to disabled motorists. These actions prompted the courtesy patrols to "double-team" for periods of time, hindering program effectiveness.

AAA's management met with tow associations and presented information about the program. No opposition was met in that setting. The protesting companies may not, however, be a part of the organized industry. CDOT sent letters to tow companies identified by AAA drivers as being involved in harassment. Toward the end of the program, the situation appeared to ease.

Second, some courtesy patrol drivers complained of "burn-out" from driving courtesy patrol shifts. When no incidents occur during a shift, the courtesy patrol operator does nothing other than drive. This is causing some problems, mainly boredom, particularly for AAA drivers who work twelve hour days. Two courtesy patrol shifts are added to the ends of a six hour shift doing regular AAA emergency road service work. This problem is not occurring with the CSP since many of their drivers are working on their days off or doing only one courtesy patrol shift before or after their regular CSP duties. Also, as will be discussed later, CSP-manned patrol units cover a larger territory and deal with more incidents, on average, than do the AAA drivers.

CHAPTER 3

Incident Management by the Courtesy Patrol

Between August 28, 1992 and February 26, 1993, the courtesy patrol reported 3,393 incidents. This translates into an average of 27.6 incidents per day.

Type of Problem

Courtesy patrol operators filled out a form describing each incident they observed. (The form is shown in Figure 1-1 at the end of chapter 1). Their characterization of the problem underlying each incident is reported in Table 3.1.

Table 3.1 Incidents by Type of Problem		
Type of Trouble	Count	Percent Breakdown
Miscellaneous Mechanical	1154	34%
Abandoned Vehicle	730	22%
Flat Tire	465	14%
Out of Gas	361	11%
Accident	290	9%
Miscellaneous Other	213	6%
Radiator Problem	107	3%
Debris on Road	47	1%
Total	3393	100%
Note: Percentages may not add to 100 due to rounding. The count of incidents may differ from table to table due to missing data.		

The courtesy patrol is equipped to respond immediately to several common problems confronting motorists: flat tires, running out of gas and radiators overheating. These problems accounted for a little over a quarter of the incidents reported. Other types of mechanical problems accounted for a third of incidents. Abandoned vehicles on the shoulder, a problem about which the courtesy patrol can do relatively little, accounted for 23% of incidents. Nine percent of reported incidents involved accidents, affecting one or

more vehicles. The courtesy patrol also reported a wide range of other incidents. In some instances, the driver (rather than the car) was experiencing a problem that led him or her to pull over. For example, one driver was returning from a chemotherapy session and felt too ill to drive.

Other drivers lost their bearings and stopped to read a map. Yet others paused on the side of the road to use their cellular phones.

Since there is relatively little that the courtesy patrol can do about abandoned vehicles, this report treats them separately. They are excluded from most tables, but are separately analyzed at the end of the chapter.

When and Where do Incidents Occur?

When: Incidents are fairly evenly distributed by day of the week. On Mondays and Tuesdays, there were slightly more incidents and on Thursdays and Fridays slightly fewer.

More incidents occur during the afternoon rush hour than in the morning. Table 3.2 shows that 55% of reported incidents occurred during the afternoon. The imbalance between morning and evening is more pronounced during the latter half of the week.

Table 3.2 Incidents by Day of Week and Time of Day						
	All	Mon.	Tues.	Wed.	Thur.	Fri.
Percent of Incidents	100%	21%	22%	20%	18%	18%
Proportion of Incidents Occurring During evening rush hour	55%	52%	52%	56%	59%	56%
Note: Percentages may not add to 100% due to rounding.						

Where: On a lane mile basis, the greatest density of incidents over the course of the pilot program occurred between Alameda and Eighth on I-25 (29.6 incidents per lane mile), followed closely by the stretch of roadway between eighth and Auraria parkway (24.6 incidents per lane mile). Other stretches of road exceeding the average number of incidents per lane mile of 14.1 include I-25 County Line road to Hampden and I-25 between 38th avenue and 58th avenue. Total numbers of incidents reported over the six month demonstration program per lane mile, broken by morning and evening rush hours and direction are shown in Table 3.3.

Table 3.3 Location of Incidents							
Road Segment	Total Incidents	Est, Lane Miles	Incidents Per Lane Mile				
			Total	Morning Rush Hour		Evening Rush Hour	
I-25 between (Exit #):			All Dir.	NB	SB	NB	SB
County Line (195) and Hampden (201)	610	36	16.9	2.8	3.9	4.8	4.5
Hampden and Downing (206A)	409	30	13.6	2.0	4.2	2.7	4.3
Downing and Alameda (208)	141	12	11.8	2.5	3.7	2.2	2.8
Alameda and Eighth (209C)	237	8	29.6	7.0	6.0	9.0	6.5
Eighth to Auraria (210C)	197	8	24.6	6.4	5.6	4.8	7.1
Auraria to 38th (213)	182	24	7.6	1.4	1.3	2.9	1.7
38th to 58th (215)	274	16	17.1	2.6	3.9	5.7	4.7
58th to 84th (219)	338	30	11.3	1.9	3.9	2.8	2.4
I-70 Between							
Federal (272) and Washington (275A)	175	18	9.7	2.8	1.7	2.1	3.1
*Totals include incidents where direction of travel was not noted.							

Vehicle Position on the Roadway

In almost three quarters (72.7%) of the incidents reported, the vehicle was not in a lane of traffic. Most vehicles (63%) were found on the right shoulder. This is reported in Table 3.4.

Some types of incidents were much more likely to involve a traffic lane than others. For example, about half the accidents reported had a vehicle positioned in a traffic lane. Over a quarter of vehicles stopped due to a mechanical problem were in a traffic lane.

Vehicle Type

Cars accounted for 61% of incidents; pickup trucks or vans accounted for another 29%. Larger vehicles such as trucks, vehicles with trailers, or busses (that could pose greater difficulty for the MHCP in terms of movement) accounted for just under 9% of incidents.

Table 3.4 Position of Vehicle	
Left Lane	6%
Middle Lanes	4%
Right Lane	10%
Accel/Decel Lane or Exit/Entr. Ramp	8%
Left Shoulder	4%
Right Shoulder	63%
Off Road or Ramp Shoulder	6%
Note: Percentages may not add to 100% due to rounding.	

Detection Mode and Response Time

The great majority of incidents (90%) were detected by the courtesy patrol. Nine percent came through Metro Traffic Control or the dispatcher. The police scanner and the traffic control superintendent accounted for the final 1% of incidents.

The courtesy patrol took seven minutes on average to arrive at the scene of an incident reported to them by any outside source.

Services Rendered

The courtesy patrol is capable of providing a range of services to stopped motorists. They are prepared to fix flat tires, provide a free gallon of gasoline, fill radiators with water, jumpstart stalled vehicles and fix some other minor mechanical problems. If vehicles have more serious or difficult-to-identify mechanical problems, the courtesy patrol can move the vehicle or call for other assistance.

In addition to providing services to the stopped motorist, the courtesy patrol will protect the scene (particularly if the vehicle is in a lane of traffic). Using its emergency lights, it can

alert upcoming motorists to the problem and hence avoid potential accidents.

The courtesy patrol may provide more than one service at any one incident. For example, it might push the vehicle out of the lane of traffic and then provide gasoline. Or it might protect the scene and then move debris off the roadway. All told, the courtesy patrol reported providing an average of 1.16 services per incident.

The courtesy patrol will not provide direct services if the motorist does not wish to receive them. Service was refused in 14% of the cases. The usual reason for rejecting service was that the situation was under control or that help was already on the way.

Table 3.5 shows the proportion of incidents classified by problem type that receive different kinds of service. It is the base for much of the discussion that follows.

Table 3.5 Percent of Cases Receiving Specified Service								
Percent Receiving:		Presenting Problem						
		Tire	Gas	Radiator	Misc Mech	Debris	Accident	Other
Service Directly Corresponding to Problem	36%	72%	81%	51%	20%	87%	na	na
Tow/Move	21%	6%	4%	13%	36%	0%	23%	7%
Protected Scene	16%	6%	5%	4%	12%	24%	66%	19%
Call for help	15%	5%	3%	12%	19%	13%	36%	8%
Other Service	13%	10%	7%	18%	12%	2%	9%	48%
Service Refused	14%	10%	7%	20%	17%	2%	4%	26%
Count of Incidents	2559	457	356	106	1122	45	280	193
Note: The same case can receive multiple services. This is why percentages add to more than 100%. Also, the count of incidents may differ from table to table due to missing data.								

Flat Tires: Fourteen percent of all incidents reported by the courtesy patrol involved flat tires. (This was reported earlier in Table 3.1). In almost three quarters of the cases, the courtesy patrol fixed the tire. In 6% of the cases, the courtesy patrol moved or towed the vehicle.

Gas: Eleven percent of the incidents reported involved a vehicle running out of gas. The courtesy patrol provided gasoline in 81% of the cases. They towed or pushed the vehicle

4% of the time.

Radiator: Only three percent of the incidents involved radiator problems (although some radiator problems might be included in the "miscellaneous mechanical" category. The courtesy patrol was able to provide a direct service about half the time. They towed or pushed the vehicle 13% of the time.

Mechanical: About one third of the incidents were caused by some kind of mechanical malfunction. In these cases, the courtesy patrol provided "mechanical services" about one fifth of the time. They towed or pushed the vehicle in 36% of the incidents.

Debris on the Road: In the 45 cases where the primary trouble was debris on the road, the courtesy patrol was able to remove the debris most of the time. (87%).

Accidents: Nine percent of the cases were accidents, sometimes involving multiple vehicles. In two thirds of the accident situations, the courtesy patrol protected the scene. They moved one or more vehicles in 23% of the accidents.

Other: The "other" category included a wide variety of cases. Sometimes there was no problem with the vehicle but the driver was experiencing difficulty of one sort or another. The driver might have needed directions, felt sick or tired. etc. Occasionally the courtesy patrol helped a pedestrian or a straying animal.

Other Vehicle Movement

As indicated above, the courtesy patrol moved the disabled vehicle, providing a push or tow in approximately one fifth of all cases (see note following Table 3.6). They were much more likely to move vehicles disabled in traffic lanes than in other positions on the roadway. Table 3.6 shows that the MHCP provided a tow or push to roughly half the vehicles disabled in traffic lanes. Vehicles disabled in other positions were less likely to be moved by the courtesy patrol.

Disabled vehicles are often moved by private tow operators as well as the courtesy patrol. Between 20% and 41% of vehicles disabled in the traffic lanes received a tow from someone other than the courtesy patrol. All told, 66 - 78% of vehicles disabled in a traffic lane received a tow or push from someone.

Table 3.7 gives further detail on vehicle movement. It indicates all vehicle movements after MHCP arrival, whether that movement was attributable to the courtesy patrol, a private tow service or the driver. Almost one third of the vehicles disabled in a traffic lane were moved to the shoulder. Almost half (45%) were towed to a "safe site" off the roadway. Only 15% of the vehicles were able to resume travel.

Table 3.6 Movement of Vehicle Based on Initial Position			
Vehicle Position	Percent Moved by:		
	Courtesy Patrol	Other Tow or Push	By Anyone
Left Lane	51%	41%	78%
Middle Lanes	48%	36%	69%
Right Lane	54%	20%	66%
Accel/Decel Lane	23%	17%	38%
Exit or Entr. Ramp	27%	13%	37%
Left Shoulder	26%	31%	45%
Right Shoulder	17%	7%	25%
Ramp Shoulder	13%	10%	18%
Off Road	10%	7%	17%
All Positions	24%	14%	35%
Note: This table shows a higher percentage of incidents receiving a tow or push from the courtesy patrol than does Table 3.5. There is some internal inconsistency in reporting. When asked on the form about the type of service provided, only 21% showed a tow or move. When asked about vehicle movement and who did it, some additional forms indicated movement by the courtesy patrol.			

The pattern of movement for vehicles disabled in other positions on the roadway was different. A larger proportion were able to resume travel, but significant numbers were towed to a safe site off the roadway.

Table 3.7
Patterns of Vehicle Movement and Incident Duration

Initial Vehicle Position	Moving To:	Minutes Elapsed from MHCP Arrival Until:	
		Vehicle Movement	MHCP Departure
Right Shoulder (n=922)	6% → Shoulder	9.7	11.6
	3% → Off Road	14.2	10.8
	30% → Safe Site	12.0	16.2
	61% → Resume Travel	8.8	9.1
Left Shoulder Ramps (n=173)	12% → Shoulder	8.0	13.1
	6% → Off Road	9.9	14.2
	37% → Safe Site	12.1	17.0
	45% → Resume Travel	7.9	9.2
Traffic Lanes (n=383)	31% → Shoulder	7.6	13.6
	9% → Off Road	12.7	18.8
	45% → Safe Site	10.1	15.6
	15% → Resume Travel	8.6	9.9

Incident Duration

To minimize congestion, incidents disabled in traffic lanes (or on the shoulder within six feet of traffic) must be moved off the road as quickly as possible. Tables 3.7 and 3.8 indicate how long it took after MHCP arrival for the vehicle to be moved. On average, vehicles disabled in the traffic lane were moved out of that lane 9.9 minutes after MHCP arrived on the scene. The time it took to move the vehicle varied somewhat depending on the type of movement. Vehicles resuming travel moved in just 8.6 minutes. It took 12.7 minutes to tow or push vehicles off the roadway.

The courtesy patrol spent longer servicing each incident than is indicated by these "movement" times. This is also shown in Tables 3.7 and 3.8. The longer time is required because the move itself may take time, particularly if the move is to a safe site off the roadway. In addition, the courtesy patrol may provide a second service after the initial movement. For example, a car might run out of gas while in a lane of traffic. After moving the vehicle, the courtesy patrol would fill the car with a gallon of gas, enabling it to resume travel.

Table 3.8 Incident Duration by Position of Disabled Vehicle on the Roadway				
Incidents	Response Time	Service Time		Total Incident Duration
		Through First Vehicle Movement	Total	
All	1.1	9.6	11.2	12.0
Traffic Lanes	1.9	9.9	13.9	15.5
Left Shoulder/Ramps	1.2	10.4	12.4	10.8
Right Shoulder	0.8	9.3	10.2	13.4

Was the Incident Cleared?

courtesy patrol drivers reported whether, in their judgement, the incident was cleared at the time of their departure from the scene. An incident could be considered cleared if there had been an acceptable disposition of the vehicle involved and no further traffic impact. Overall, 80% of incidents (excluding abandoneds) were considered "cleared" when the courtesy patrol left the scene.

Table 3.9 reports the final status for incidents based on initial roadway position. In every position category, three quarters or more of incidents were deemed as "cleared" by the courtesy patrol.

Table 3.9 Incidents Cleared by Vehicle Position	
Vehicle Position	Percent of Incidents Cleared
Left Lane	93%
Middle Lanes	90%
Right Lane	91%
Accel/Decel Lane	87%
Exit or Entr. Ramp	78%
Left Shoulder	80%
Right Shoulder	78%
Ramp Shoulder	75%
Off Road	76%

CHAPTER 4

Comparison of Alternative Service Delivery Models

The courtesy patrol pilot program used two service delivery approaches. The differences between the approaches are summarized in Table 4.1.

- The Colorado State patrol, operating under contract to CDOT, provided the service on I-25 north of Colfax and on I-70 between Washington St. and Federal Blvd. The CSP used off-duty uniformed officers driving four wheel drive vehicles specially equipped with push bumpers. The regular CSP dispatcher provided information on incidents. In addition, the courtesy patrol had direct access via portable radio to the communications system developed in support of the construction project along I-25. The patrol could use the same radio to communicate directly with Metro Traffic Control.
- The AAA, also operating under contract with CDOT, provided service along the southern portion of I-25 using regular tow trucks. Drivers apportioned their day among courtesy patrol duties (during rush hours) and regular AAA membership emergency tow services during other hours. The courtesy patrol communicated through the regular AAA dispatch system which in turn maintained contact via phone with Metro Traffic Control.

Workload

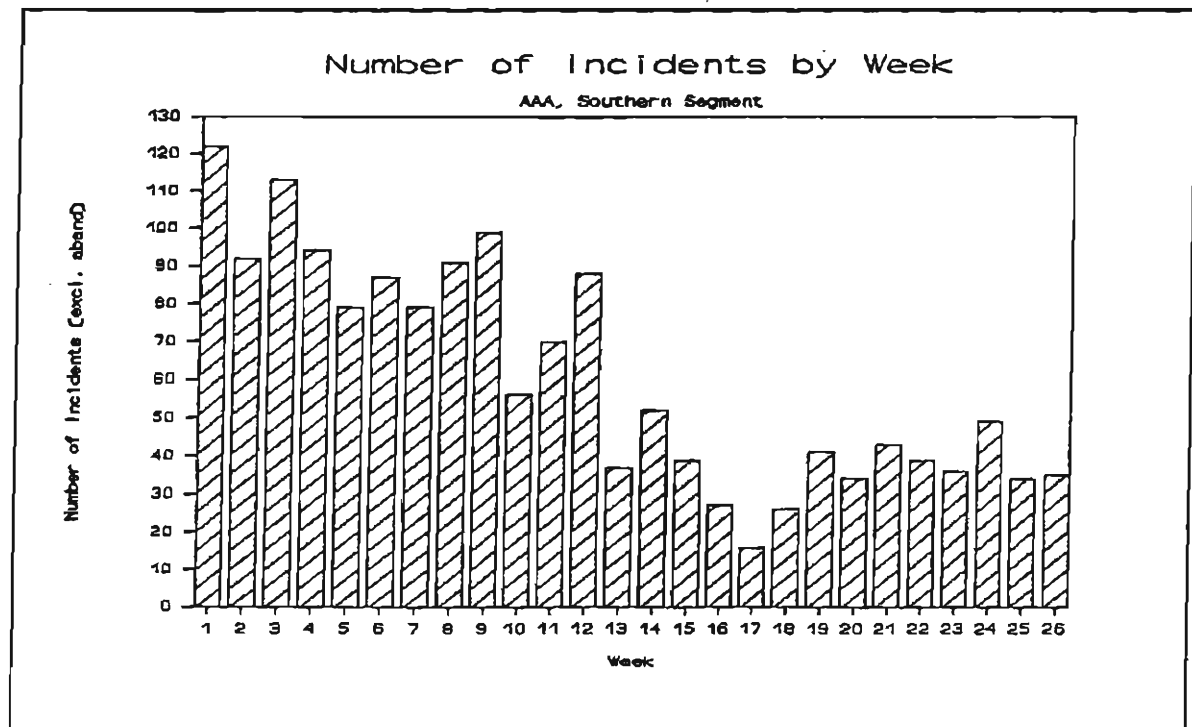
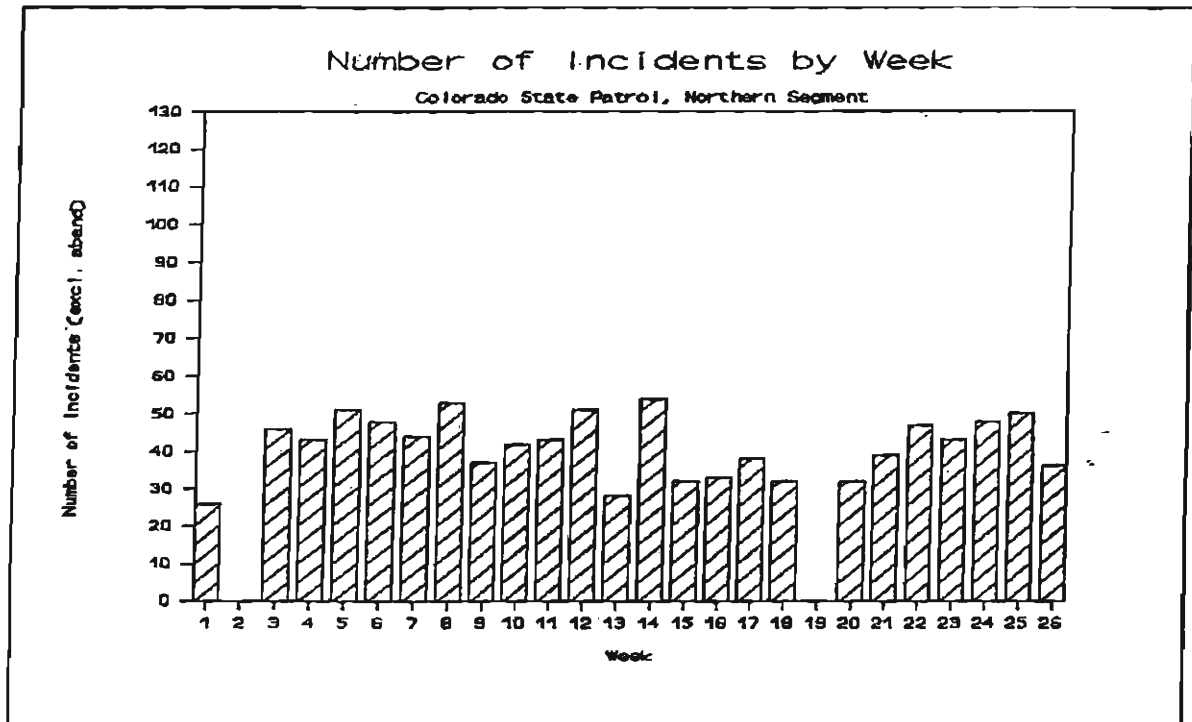
The workload assigned to the state patrol is higher than AAAs. CSP was assigned to patrol 12 miles of road, including 88 lane miles using two patrol units. AAA in contrast fielded 4 patrols on 15 miles of road including 94 lane miles.

On CSP's stretch of roadway, fewer incidents were serviced per lane mile (12 vs. 17). (see Table 4.1) CSP served approximately one third more incidents per patrol unit, however, than did AAA.

When incidents are tallied by week, however, an interesting pattern emerges. During the first three months of the program, AAA (with its four units) served an average of 85 incidents per week, more than twice as many CSP's two units. During the latter half of the demonstration program, CSP's workload remained relatively steady (averaging 43 incidents per week in the first three months and 40 in the latter three). The number of incidents served by AAA, on the other hand, dropped off substantially in December, January and February, averaging just 36 incidents per week. During those months, AAA encountered difficulty with private tow operators causing them to "double-team" for safety reasons. Figure 4-1 depicts the volume of incidents by week.

Table 4.1 Comparison of Key Features CSP vs. AAA Implementation of the Courtesy Patrol Program		
	CSP	AAA
Territory	I-25 between Colfax and 84th Avenue; I-70 between Federal and Washington	I-25 between Colfax and County Line Rd.
Equipment	Four Wheel Drive vehicle equipped with push bumpers	Standard Tow Truck
Personnel	Off-Duty, uniformed, state patrol officers	Regular AAA tow truck drivers
Communication	Linked by stationary radio to CSP dispatcher; Linked by portable radio to state base's construction-based communications system and to Metro Traffic Control.	All communication via stationary radio to AAA dispatcher. Dispatcher communicates by phone with Metro Traffic Control.
Number of Patrol Units	2	4
Roadway		
Center Line Miles	12	15
Lane Miles	88	94
Incidents (excluding abandoneds)		
Per Patrol Unit	529	395
Per Lane Mile	12	17

Figure 4.1 Number of Incidents by week.
Note that the CSP data for weeks 2 and 19 are missing



Detection Mode and Response Time

AAA detected a greater proportion of its incidents on its own (95%) through direct observation of the roadway than did the Colorado State Patrol (82%). More direct communication linkages with outside sources by CSP could account for some of the difference. But the primary explanation is likely the large difference in mileage patrolled by the two organizations. AAA should have a unit pass any given point every five to six minutes while the state patrol would take roughly nine minutes.

Table 4.2 Detection Mode and Response Time				
Detection Mode	Percent of Incidents		Average Response Time	
	CSP	AAA	CSP	AAA
Dispatcher*	4.7%	2.8%	6.8	4.1
Metro Traffic Control*	10.8%	1.8%	7.8	4.1
Police Scanner	.9%	.1%	16.6	0
Traffic Control Superintendent	1.6%	na	6.2	na
Direct Detection	82.1%	95.4%	1.2	.2
Total	100.0%	100.0%	2.1	.3
* CSP has direct radio access to Metro Traffic Control. For AAA, incidents detected by Metro Traffic Control are communicated via the AAA dispatcher so the breakdown between these two categories has no meaning.				

Once an incident is detected, AAA's response time is also less than CSPs. In part this is attributable to a larger percentage of incidents that are self detected. But even for incidents detected by others, AAA is able to get on the scene faster. Again, this is very likely attributable to the shorter route assigned to each patrol unit.

Service Delivery and Time Involved

The delivery models differ in several respects that could have implications for service delivery. Most obviously, they differ in the type of equipment and the character of the personnel manning the vehicles.

AAA is equipped with tow trucks. As a result, the courtesy patrol units operated by AAA can tow rather than push disabled vehicles. With tow trucks it is safe and easy to move disabled vehicles. It is the only feasible way to move disabled vehicles longer distances (to

safe sites off the roadway rather than to the shoulder). When CSP confronts a problem in a traffic lane or on the shoulder too close to moving traffic, its options are more limited. It can push most vehicles a short distance to a safer position along the roadway where they would have less impact on traffic flow. Longer moves aren't possible with push bumpers nor is pushing certain types of vehicles. Assuming there is a shoulder, vehicles will be moved out of the lane of traffic, but they very likely will sit along the shoulder for longer periods (waiting for a private tow), than they would have, had the incident occurred on the southern stretch of roadway served by AAA. On stretches of road without a shoulder, a courtesy patrol without a tow truck is at a distinct disadvantage.

The data in Table 4.3 show that AAA did provide tows in substantially more of the incidents served than did the CSP – 24% vs. 16%. CSP, understandably, placed more calls for additional assistance, presumably to private tow companies to move disabled vehicles. Table 4.4 recognizes that disabled vehicles are sometimes moved by private tow companies instead of or in addition to the courtesy patrol. When these additional tows are taken into account, the experience of vehicles disabled in CSP's zone and AAA's zone is more similar. In AAA's service zone, 37% of incidents ended up involving a tow -- sometimes from the MHCP and sometimes from another tow service and sometimes from both in sequence. The equivalent figure for incidents served by CSP's courtesy patrol is 32%.

There were some other differences in the type of service provided (shown in Table 4.3) that are harder to explain. AAA provided a higher percentage of cases with some of the routine services the courtesy patrol was expected to perform such as fixing tires, providing gas, and fixing minor mechanical problems (40% vs. 29% of cases served by CSP). Whether this reflects a real difference in the level of service provided or a different approach to filling out the reporting form is difficult to say. CSP provided "other" not designated services in more

Table 4.3 Services Delivered by MHCP		
Service	Percent of Incidents Receiving Each Service	
	CSP	AAA
Fixed Tire	9.6%	15.2%
Gave Gas	9.5%	13.7%
Gave Water	2.0%	2.6%
Mechanical	7.5%	10.6%
Tow/Push Vehicle	16.0%	24.3%
Protected Scene	15.9%	16.5%
Called Help	22.9%	9.2%
Moved Debris	1.0%	3.7%
Other	18.6%	6.1%
Service Refused	12.5%	14.3%
Number of Services Rendered	1191	1775
Number of Cases	1031	1529
Services/Case	1.16	1.16
Note: percentages will not add to 100% since the same incident can receive multiple services.		

instances than did AAA. Overall, each provided an average of 1.16 services per incident.

Table 4.4 Vehicle Movement by MHCP or Other Tow Service						
Position	Percent Moved by MHCP		Percent Moved by Other Tow		Percent Moved By Any Tow/Push	
	CSP Zone	AAA Zone	CSP Zone	AAA Zone	CSP Zone	AAA Zone
Lanes of Traffic						
Left	54.9%	48.5%	41.2%	40.6%	76.5%	79.2%
Middle	60.0%	38.9%	32.5%	38.9%	67.5%	70.4%
Right	54.0%	53.3%	22.5%	17.3%	65.8%	66.0%
Other						
Accel/Decel Lane	30.0%	20.0%	25.0%	12.5%	50.0%	32.5%
Exit or Entrance Ramp	23.3%	30.1%	15.0%	11.0%	31.7%	41.1%
Left Shoulder	22.5%	32.4%	29.6%	32.4%	39.4%	56.8%
Right Shoulder	9.8%	20.7%	14.4%	6.7%	20.8%	27.1%
Ramp Shoulder	8.3%	18.8%	2.8%	12.5%	8.3%	28.1%
Off Road	10.8%	9.1%	8.1%	6.8%	18.9%	15.9%

The two service delivery models differ in other respects besides equipment. CSP uses off-duty but uniformed law enforcement officers to provide courtesy patrol services. It was expected that the uniform would carry authority and inspire trust, leading more motorists to accept the proffer of service. In fact, the data support the hypothesis. Table 4.3 shows a slightly lower service refusal rate among CSP-serviced incidents than AAA-serviced incidents.

Another benefit of using law enforcement personnel is that they can act more authoritatively in certain situations such as accidents. Vehicles involved in certain accident situations are not supposed to move (even if blocking traffic) until directed to do so by a law enforcement officer. A courtesy patrol operated by CSP arriving at the scene of an accident can assess the situation and direct the proceedings while AAA's primary role in the same situation would be to protect the scene (avoiding secondary accidents) and call for assistance from regular law enforcement authorities.

An examination of the time data reported in Table 4.5 shows that CSP was able to get vehicles involved in accidents moved more quickly than AAA – 12.1 minutes vs. 15.9

minutes.

In almost all other types of incidents, however, AAA was able to move the vehicle more quickly and to complete the provision of service in a shorter period of time.

Service times are also shown in Table 4.5 -- that is the time elapsed between the courtesy patrols' arrival on the scene and the time they complete the service. In the case of AAA, the service time includes the time spent towing a vehicle off the freeway to a safe site. CSP's service time may or may not include time spent waiting for a private tow to arrive on the scene. Generally, if the disabled vehicle was in a safe position, the courtesy patrol would leave the scene after arranging for the necessary help.

For some types of problems, the differences between AAA and CSP in both movement and service times were quite pronounced. For example, in incidents involving flat tires, AAA completed service in 8.3 minutes compared to CSP's 13.3 minutes. In situations involving vehicles that ran out of fuel, AAA's service time was 7.8 vs. CSP's 11.4.

The difference in service time when the problem involves a difficulty in the functioning of the auto (as opposed to an accident or problem with the driver) may be attributable to several factors. When gas is the problem, having a tow truck with an electric pump appears to offer advantage even though CSP's vehicles have electronic fuel transfer devices. When a flat tire is involved, it is difficult to say whether the time difference is attributable to greater

Table 4.5 Time Involved in Servicing Incidents				
	Move Time In Minutes		Service Time In Minutes	
	CSP	AAA	CSP	AAA
Flat Tire	13.3	7.6	13.3	8.3
Out of Gas	10.5	7.2	11.4	7.8
Radiator	10.1	12.3	11.6	12.6
Misc Mechanical	9.9	8.6	11.2	11.8
Accident	12.1	15.9	15.8	18.0
Debris on Road	14.3	7.5	15.0	8.0
Other	7.0	6.6	8.2	7.2
Right Shoulder	10.3	8.7	10.7	10.0
Left Shoulder, Ramp, Accel/Decel	9.8	11.0	12.0	12.8
Lane of Traffic	11.5	8.8	15.8	12.7
All incidents	10.4	9.0	11.7	10.9
Move Time is measured from the time MHCP arrives on the scene until they report a movement by the vehicle.				
Service Time is measured from the time MHCP arrives on the scene until they report completion of service.				

experience on the part of tow truck drivers whose routine duties include more of this activity or whether it is due to equipment differences. AAA drivers carry their own tools, and use a roll jack rather than relying on the drivers' tools. CSP, on the other hand, relies on tools carried in the disabled vehicle. Since jacks vary in mode of operation and placement on the car, this can add time to the repair process. The longer service time reported by AAA in the case of "miscellaneous mechanical" problems may reflect greater efforts to locate and repair a mechanical problem.

Incident Clearance

Relative success rates in "clearing" incidents are reported in Table 4.6. Ultimately, the evaluators relied on the judgement of the courtesy patrol operator in characterizing whether an incident was cleared. If the disabled vehicle was far enough off the roadway (at least 6 ft.) so as not to affect traffic flow, then an incident could be judged "cleared."⁸ Overall, AAA reports clearing a higher proportion of all incidents than CSP -- 84% vs. 77%. The difference is statistically significant.

The bigger differences appear to be on incidents occurring on the shoulder rather than in traffic lanes. In the traffic lanes the difference in clearance rate is never more than four percent. But for incidents on the shoulders or off road, the difference in clearance rates always exceeds six percent and in some categories is substantially more.

Table 4.6 Clearance Rates		
Position	Percent Judged Cleared" by MHCP	
	CSP Zone	AAA Zone
Lanes of Traffic		
Left	92.2%	93.8%
Middle	90.0%	89.8%
Right	89.1%	92.7%
Other		
Accel/Decel Lane	95.0%	82.5%
Exit or Entrance Ramp	79.3%	77.5%
Left Shoulder	75.8%	88.9%
Right Shoulder	73.0%	81.0%
Ramp Shoulder	72.2%	78.1%
Off Road	67.6%	83.7%
All	77.0%	84.0%

⁸ Specific criteria for deciding whether an accident was cleared were developed midway through the evaluation. Operators were provided with the following instruction for data coding: "An incident is cleared only if: 1. The car resumed travel, or 2. The car has been moved off the freeway, or 3. The car remains on the freeway, but is at least six feet from the traffic lane and in your judgement is not disrupting traffic."

Cost Comparison

The two models of service delivery differ in cost as well as performance. Under current contracts, the costs don't differ greatly but the contracts are not necessarily an accurate reflection of true costs. Table 4.7 shows an estimate of costs for the two approaches.

We estimate CSP's equipment cost using specially equipped four wheel drive vehicles at \$7 per hour. This estimate includes capital costs (assuming an acquisition cost including modification of \$15,425, 20% salvage value after two years of operation and roughly 80,000 miles) even though the agency has not charged the program for those costs. Operating and maintenance costs were assumed to be \$.127 per mile -- the amount CSP says the state fleet management program charges them. Mileage is estimated at 37,364 per year, reflecting experience during the six month pilot.

Table 4.7 Cost Comparison (Per Hour of Operation)		
Cost	CSP	AAA
Equipment Cost	\$7	\$16 - 17
Personnel	\$31*	\$12

*assume \$20 if not time and a half.

CSP's labor costs are \$31 per hour (including fringe benefits). This relatively high figure reflects the fact that courtesy patrol duties are performed on an overtime basis. Officers are paid time and a half. If the program were implemented on a permanent basis and appropriate adjustments were made in staffing allotments, courtesy patrol shifts could be incorporated into regular scheduling. Labor costs would then drop to roughly \$20 per hour.

AAA's equipment cost, using tow trucks, are estimated at \$16 - \$17 per hour. This estimate includes capital costs (assuming acquisition cost of \$42,000, 40% salvage value after two years of operation and 120,000 miles). Maintenance and operation were assumed to cost .20 per mile and total mileage --63,000-- per vehicle per year is based on AAA's actual experience. It should be noted that AAA reports substantially greater mileage per patrol unit than CSP. The difference is probably attributable to extra miles logged in towing vehicles to safe sites off the freeway. Also, with each vehicle responsible for a shorter stretch of roadway relatively more time is spent patrolling (and adding miles) than in providing direct service. AAA broke down its costs slightly differently but its estimates are within the same range. AAA reports a labor cost of \$12 per hour (including fringes and bonus differential).

CSP's costs per patrol unit are higher than AAAs -- \$38 per hour vs. \$28. They have lower equipment costs but higher labor costs. If courtesy patrol responsibilities led to higher FTE and routine assignment as part of the regular work day (rather than overtime) then the two delivery models would have virtually the same cost per hour.

Conclusion

There are clear differences between AAA and CSP and what occurred on the two segments of roadway served by the two organizations. Unfortunately, the design of the pilot program makes it hard to disentangle the effect of the multiple factors that varied:

- the length of patrol segments;
- character/condition of the road;
- equipment (tow truck vs. four wheel drive vehicle);
- personnel (uniformed law enforcement officers vs. emergency road service personnel;

Overall AAA with its shorter patrol segment was able to more quickly detect and respond to most vehicles. However, each patrol handled fewer incidents and had greater idling time (that is patrol sweeps without incidents).

With its tow trucks, AAA was able to provide services to most incidents in a shorter time period. On the other hand, with its law enforcement officers, CSP could more effectively respond to accidents — the type of incident most likely to have a severe impact on traffic.

In the concluding chapter, the results of this analysis will be combined with the traffic impact data reported in Chapter 5 to develop some estimates of the cost effectiveness of the two approaches and make some recommendations regarding program implementation.

CHAPTER 5

Motorist Satisfaction

Motorists who received services from the courtesy patrol are very pleased with the program. This is evident from the comments received by CDOT. Every time the courtesy patrol stopped by a disabled vehicle, they left a brochure and a comment card. The card was pre-addressed and postage was pre-paid so motorists could offer their opinions on the program.

The comment card is shown in Figure 5-1. By compiling responses, we gain qualitative insight into how the segment of the travelling public which received direct service views the program. Two questions were "closed-end" -- eliciting specific yes-no responses. The others were fairly broad and open-ended, allowing motorists to report on the aspect of the service that was most salient to them.

Call Number			
Date	Time	Location	
Name (optional)		Phone (optional)	
Type of assistance			
Were you satisfied with the services you received? Yes... No...			
Do you think this program is a good use of your tax dollars? Yes...No..			
Please explain:			
Comments			

Figure 5.1 Comment Card Facsimile

Over the course of the six month pilot program, 550 comment commends were returned to CDOT. Respondents were virtually unanimous in expressing satisfaction with the service they received. Only three responded "no" to the question: "were you satisfied with the service you received?"

Likewise, almost all -- 99% -- thought the courtesy patrol was a good use of their tax dollars. Only four expressed any reservation -- three who responded "no" and one who left the question blank.

When asked to explain their response, many responded in terms of the courtesy patrol being a very direct and visible use of tax dollars but most simply took the opportunity to explain their circumstances and assess generally the benefits of the program. Some representative comments directly related to willingness to devote taxes to the program include: "For once I

felt I received a direct benefit from my highway tax dollars..great job. ..This is the first time I felt my tax dollars were working"directly" for me...

Table 5-1 characterizes the comments that motorist made regarding the program. Any given card might include several types of comments. Comments were placed in the following five categories:

Table 5.1 Public Comments Regarding Courtesy Patrol	
Comment Category	Percent
Great Service/Appreciation of Personal Benefit	39%
Operator Performance	24%
Keep/Expand Service	13%
Broader Public Benefits	15%
No Comments Written	10%

General Appreciation/Personal Benefits

Many of the motorists commented that the program was a great idea and they appreciated the service received. Typical comments are:

"The service was great....Friendly and fast service....Great program...Service is magnificent...The response time was less than five minutes...Very professionally handled....Keep it up Colorado, you're ahead of the ballgame. Service was efficient and so helpful. Made a stressful situation easy to handle with a minimum amount of delay.... Way to go Colorado C.D.O.T. Keep up the great work.."

Each of the motorists had of course received a personal benefit from the patrol. Many of the comments addressed what that meant to them personally. The comment cards made clear that many people are very scared and feel very helpless when their cars breakdown on the highway. They fear injury from a related traffic incident.

"Our car stalled in the middle of rush hour when the timing belt broke. I felt we could have been hit any time until we were off the road.... Without their help, we would have had to risk our lives pushing the car....The tow truck

rescued me from a dangerous situation. Who knows how long I could have waited for help. I was nearly hit several times by passing cars."

Many, especially women, fear they will become a crime victim.

"Being a woman stranded on the side of the road after dark is scary.... I am a single women and its very frightening to feel stranded on the highway....I was terrified. I wanted someone to stop and help me only I feared for my life. You never know about people now adays.....The program removes crime victims from the highways in the evening."

Others indicated that their only option would have been to walk for help since they lacked the knowledge or materials needed to handle the situation. Several indicated they were reluctant to do so -- either because they fear injury, crime, or that their car would be vandalized if left unattended. Others suggested walking wasn't feasible -- given the presence of young children in the car, age, handicap or weather conditions.

"I'm 80 years of age and without the assistance I don't know what would have happened to me....No one wants to leave their car on the side of the road unattended.

Motorists spoke of the time and frustration that was avoided as a result of prompt service by the courtesy patrol. A number indicated they were able to get to work on time thanks to the courtesy patrol. A delivery truck driver noted that it might have saved him a customer. "I was a mile from the nearest phone -- in heavy traffic -- your service saved me a ton of frustration, money and time."

Finally, others spoke of the direct economic benefit -- of not having to pay for a private tow. Others said they were travelling with insufficient cash in their pocket and didn't know how they would have managed to pay for help. Several felt that private tow operators rip off motorists who lack other options. "I travel the same stretch of I-25 every day. I see the courtesy patrol giving assistance and that gives me peace of mind -- someone to help who isn't just out to make a fast buck...Saved me money and hassle"

Many expressed gratitude for the tangible help and moral support offered by the courtesy patrol.

"THANKS for the prompt assistance...Thank you, thank you, thank you...This Is a wonderful program....Service was efficient and so helpful. Made a stressful situation easy to handle with a minimum amount of delay...A friend in need...Its nice to have a helping hand when in need, especially at no charge.."

Operator Recognition/Appreciation

The second category of comments address the way in which the service was provided by the courtesy patrol. Approximately one quarter of the comments specifically addressed the way the service was delivered by the courtesy patrol operator. Many mentioned the operator by name. All commended the operators for their courteous and professional service.

"Thank you Dan for your help and being polite... The driver was very courteous...The officer was friendly and I felt much better as soon as he showed up. ...I am very impressed with officer T's courtesy and helpfulness. Could you please relay this to him... Eric was a lifesaver...Andy was very nice and professional. It's nice to know that on the highway or anywhere there are people like him..The gentleman who helped us was very nice and would not accept a tip...The patrolman who helped us was very courteous and professional...Steve was most courteous and helpful in an awful situation...,Eric was professional and very helpful. He took the time to explain the service thoroughly. He is to be commended....Very impressed, especially with the officer that stopped, really a nice guy and very helpful. GOOD PROGRAM! ...It was a nervous situation for me and I really appreciated his help and attitude...The officer provided us with assistance and gave us moral support."

Public Benefits

While grateful for the personal benefit received, a number of the motorists suggested that the program had broader public benefits. Overall, about 15% of the comments addressed these broader public benefits including freer traffic flows and lesser congestion, and fewer accidents.

"It will keep the traffic flowing better on the interstate...Help is there when you need it and there is no traffic back up...Traffic seems to flow better since the program started....relieves traffic congestion...reduces congestion and air pollution by keeping traffic flowing...I am a twice a day rush hour commuter and I have noticed a significant drop in congestion since the program's introduction...increases safety, reduces congestion and pollution...less accidents on the highway, less congestion...It can help prevent accidents and is a great service...Keeping roadways clear improves traffic flow dramatically...If this program didn't exist I think there would more injuries or fatalities...Very good for someone to do this. Keeps traffic flowing at a good rate which saves fuel consumption and keeps air cleaner."

In addition, several motorists suggested that it was beneficial for law enforcement agencies to have these kinds of positive contacts with citizens.

"The first time in my life a cop helped me out instead of penalizing or frustrating me...I hope you folks notice how the public warms to the CSP when they are being helped not hassled....If the public has a good feeling towards the officers, that feeling can only help increase the personal safety of each patrolman on patrol."

Calls for Keeping/Expanding the Service

A number of the comments called for keeping the service or expanding it. Motorists wanted the service available longer hours and in more locations. Specifically mentioned were Sixth Avenue, I-70, I-225, the Boulder Turnpike, C-470, further south on I-25.

"Keep this project...Have more of the same...An extension of winter evening hours (until 7 P.M.) would probably be beneficial to the after dark commuter public...Just continue it...Run trucks longer hours...Keep it going...Add I-225 and more of I-70...Expand hours to all day...Great program- hope it becomes full time not just a test...Expand it to other areas....Increase the range and hours of operation...Please continue this program..."

Potential Improvements

Several motorists suggested that the program needed more advertising and publicity. Coupled with this was a call for better communications links so that the courtesy patrol could more easily be called to the scene of a breakdown by passing motorists with radios or cellular phones. This communications is only possible with greater advertising. A couple of motorists suggested adding call boxes along the roadway to further facilitate communication.

Several motorists wished there were more options regarding where their vehicle might be towed. Some suggested a willingness to pay for an extended tow.

Conclusion

The overwhelmingly positive comments speak well of the courtesy patrol drivers and the way they are delivering the service. On the other hand, it is not surprising that drivers who had just experienced a breakdown and received help -- at no charge -- would be pleased and grateful.

The bigger question is whether drivers, who do not directly experience a breakdown are aware of the program and perceive its benefits in terms of traffic flow and personal insurance value. A broader citizens survey was outside the scope of this evaluation.

CHAPTER 6

Evaluation of Traffic Impacts

Approach to Analysis

We used a deterministic queuing model to estimate the average vehicle delay caused by incidents found to occur at different locations along I-25. Morales found this type of queuing model to yield close estimates of accident delays on freeways in a study for FHWA.⁹ Janson and Rathie describe the use of this approach for estimating vehicle delays due to accidents on multi-lane freeways and interstate highways.¹⁰ Other models developed for estimating accident delays were not tested or applied in this study for the following reasons. First, the scope of this study did not permit expensive and lengthy implementation of more detailed modelling techniques requiring additional data. Second, the approach used here is often discussed and generally accepted in the studies of accident delay. Third, Janson and Rathie found delay estimates from this approach to compare well with reported data in a Goodell-Grivas study¹¹. Finally various assumptions in the approach used here (such as percent lane closure and capacity loss due to various types of accidents) can be easily adjusted so as to examine the sensitivity of the impacts. For example, we report delay estimates for both high and low assumptions of capacity reduction due to right shoulder stalls. We then check whether our basic conclusions vary over this range, allowing that the actual delay lies within it. Janson and Robles are performing dynamic traffic assignment simulations for the portion of I-25 discussed here, and preliminary results of accident scenarios within that framework do not contradict the magnitudes of delay estimates reported here.¹²

⁹ J.M. Morales, "Analytical Procedures for Estimating Freeway Traffic Congestion." *Institute of Transportation Engineers Journal*, 1987 pp.45

¹⁰ B.N. Janson and A. Rathie, "Economic Feasibility of Exclusive Vehicle Facilities" *Transportation Research Record*, 1305, pp. 201-214

¹¹ Goodell-Grivas Inc. *Examination of Truck Accidents on Urban Freeways*, Final Report. FHWA-RD-89-201. Federal Highway Administration. Washington D.C.: U.S. Dept of Transportation 1989.

¹² B.N. Janson and Robles, *Dynamic Traffic Assignment with Arrival Time Costs*, Twelfth International Symposium on Transportation and Traffic Theory, Berkeley, California. July 21-23, 1993.

A traffic incident (depending on severity) involves the following phases.

- **Detection Phase** - time from initial event (accident or breakdown) to time that persons capable of responding to the incident are notified of it.
- **Response Phase** - time from notification of persons able to respond to time that such persons arrive at the incident location.
- **Service Phase** - time from arrival of persons able to respond at the incident to time that incident is sufficiently cleared from highway such that normal capacity of the highway is restored.
- **Queue Dissipation Phase** (or traffic restoration time) - time from highway being restored to normal capacity to time that traffic is moving as usual for that highway location and time of day.

Obviously, complications arise that confound this phase description. First, some accident debris or obvious facility damage may linger long beyond the accident clearance, which can cause traffic to slow as drivers observe its extent. Stalled vehicles due to mechanical breakdowns may also be pushed off onto the shoulder of a highway for quite some time, causing the same slowing effect on traffic speeds. Finally, in bad weather, highway capacity may be well below normal both before and after the incident. This study places its emphasis on non-accident incidents. A major benefit of the MHCP is to clear these vehicles from the highway within minutes rather than hours or days via towing or mechanical repair.

Total vehicle delay caused by incidents depends heavily on the following:

- Time duration of each incident phase listed above.
- Traffic volume (vehicles per hour) on the highway approaching the incident location during each incident phase less any diversion of traffic, which depends on the number of route diversion options available to vehicles upstream from the incident location.
- Number of blocked and unblocked lanes at the incident location during each incident phase. Lanes are blocked by physical obstruction or by the safety zone needed to avoid the incident scene, whether indicated by cones, flares, or flags, or driver sense. Capacity is effectively reduced as well by drivers observing the incident activity (i.e. the gawking effect).

A study by Goodell-Grivas (1989) concluded that vehicle delays on urban freeways due to truck accidents can cost more than twice the total fatality, injury and property damage cost of those accidents.

An incident causes queuing and vehicle delays because the vehicle arrival rate (hourly vehicle volume) exceeds the vehicle service rate (unblocked lane capacity) during the first three incident phases. Figure 1 shows a graph of the queuing delays caused by a lane blocking incident as estimated by a deterministic queuing model.

Total vehicle delay caused by an incident equals the shaded area in Figure 6.1. The slopes of lines indicated by C_1 and C_2 equal the capacity of a highway during the incident clearing and queue dissipation phases, respectively. The incident clearing phase (sum of phases 1-3) is from event time t_0 to time t_2 when all lanes are cleared. The queue dissipation phase (phase 4) is from time t_2 to time t_3 when the queue disappears. At time t_2 , when the incident is cleared from blocking any lanes, the road's capacity returns to its pre-incident level C_2 . Since C_2 exceeds the vehicle arrival rate V_2 , the queue begins to dissipate. Morales found that a highway may not return to its pre-incident service rate at one time, and that short intermediate steps or piecewise linear segments between lines C_1 and C_2 can represent certain incident clearing processes in more detail.¹³ This additional detail was found to alter the total delay estimate by less than 10% in cases where it was used.

The vehicle service rate of unblocked lanes during the incident clearing phase denoted as (C_1) depends on the number of open lanes, plus other factors that affect vehicle flow such as smoke, debris, visible wreckage, and emergency equipment. This lower vehicle service rate can be estimated by adjusting the capacity of open lanes for the merging and caution exhibited by vehicles in passing an incident. The incident data reported by Goodell-Grivas (1989) show the open lanes beside incidents to have an average service rate of 67% of their usual capacity. For example, if one of 3 lanes is blocked lanes and the usual capacity of each lane is 2000 vehicles per hour, the vehicle service rate of the two partially open lanes will, on average, reduce to 2667 vehicles per hour due to the effects of driving behavior near an incident scene.

With regard to vehicle arrival rates, the delay calculation allows the arrival rate of vehicles at the rear of the queue to decrease at time t_1 because of route diversions or lessening travel demand. Increasing travel demand could actually cause the arrival rate to increase at t_1 . Computationally, the total travel time delay of an incident is equal to the shaded area in Figure 1 as given by the following equation developed by Janson and Rathi (1991).

$$\begin{aligned} \text{Delay} &= 0.5 [t_1^2 (V_1 - C_1) - (t_2 - t_1)^2 (C_2 - C_1)] \\ &+ 0.5 (t_3 - t_1) [t_1 (V_1 - C_1) + (t_2 - t_1) (C_2 - C_1)] \\ \text{where,} \\ t_3 &= t_1 + [t_1 (V_1 - C_1) + (t_2 - t_1) (C_2 - C_1)] / (C_2 - V_2) \end{aligned}$$

Delay = total hours of vehicle delay (not weighted by differences in person or goods value of time or occupancy).

¹³ Morales, op.cit.

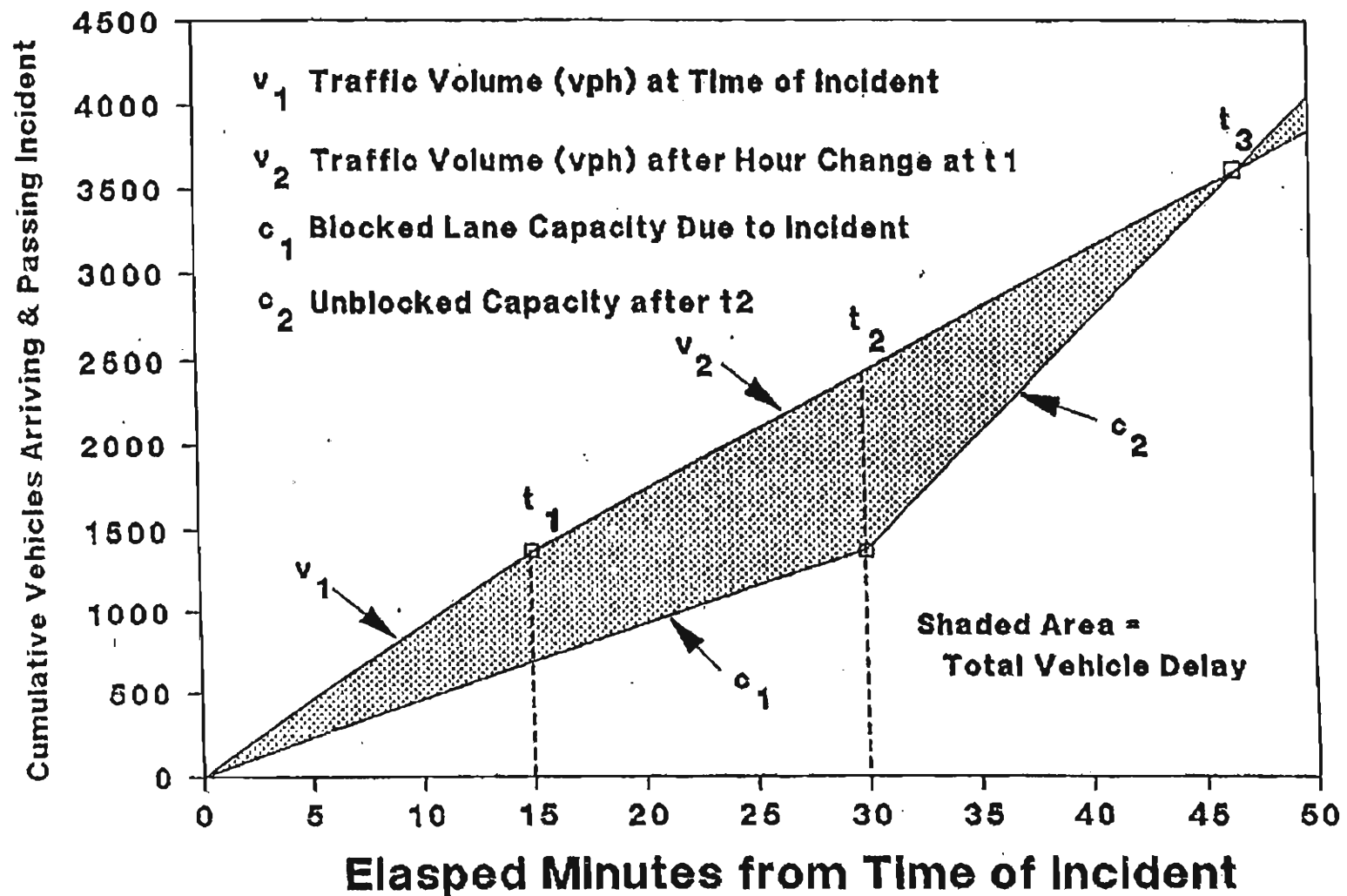


Figure 6.1 Estimation of Vehicle Delays Due to Incidents

N_i	=	number of highway section lanes (blocked or unblocked).
L_q	=	length of queue (in miles) at which vehicle arrival rate decreases; assumed equal to one-half the average distance between interchanges unless analyst inputs a different value.
t_1	=	hours after incident when vehicle arrival rate changes due to route diversion options or changes in travel demand.
t_2	=	hours after incident when all lanes are cleared (input).
t_3	=	hours after incident when queue disappears (calculated).
V_1	=	hourly vehicle arrival rate until time t_1 ; assumed equal to the hourly vehicle volume at the time of the incident.
V_2	=	hourly vehicle arrival rate from time t_1 to time t_3 .
C_1	=	hourly vehicle service rate before t_2 when all lanes are cleared.
C_2	=	hourly vehicle service rate after t_2 when all lanes are cleared.

The queuing model is used to estimate the traffic delays associated with incidents occurring along with southern stretch of I-25 in northbound lanes. The model uses actual times and road positions associated with incidents and actual traffic volume data for the time of day that the incident occurred. The analysis is restricted to this portion of roadway covered by the MHCP because only there is the technology in place to provide accurate data on traffic volumes.

The model allows us to estimate what traffic delays would have been assuming different times involved in incident detection, response and service. Hence we can compare estimated traffic delays during the period when MHCP is operating with estimates of what would have occurred prior to MHCP implementation.

Our understanding of incident response prior to MHCP is somewhat limited. It is based on traffic incident data for I-25 in the Denver metro area collected from Metro Traffic Control (a private organization that collects traffic information and provides reports to area radio and television stations). With the cooperation of Metro Traffic Control, reports of all incidents occurring from June 1 through August 30 occurring during weekday rush hours were compiled.

Metro Traffic Control reported an average of 4.4 incidents per day, a fraction of the total number of incidents now known to exist based on MHCP data. Incidents attributable to

accidents and involving a lane of traffic comprise a larger share of the Metro Traffic Control reports than of the MHCP evaluation data base. This difference must be taken account of in the analysis.

Another more serious difficulty is the accuracy of the estimates of incident duration. Printouts provided by Metro Traffic Control indicate when incidents were first observed by the sky observers (or first reported by other means). Hence the observation is dependent on the flight pattern of the observers. Likewise information on incidence clearance depends on when the flight observers could next observe that stretch of road. Estimates of duration are only approximate but are the best available.

Core Inputs to the Impact Analysis

As noted above, three factors determine impacts of incidents on traffic flows: the time duration of each incident, the traffic volume at the time of the incident, and the number of blocked and unblocked lanes.

Time Duration: Time duration involves detection, response, service time and queue dissipation. No direct estimates of detection time are available for the period when MHCP is operating or before. One can assume that incidents are being detected faster now with the addition of regular patrols but there is no proof. In our modeling, we have assumed no difference in detection time. We have estimated detection time at roughly 5.5 minutes which is the time estimated to elapse between visual observations by the courtesy patrol of any given point along the southern stretch of roadway.

Data are available on response and service times. The two can be separated for the time period after MHCP started operations but not before. That data were reported in chapters three and four. In the prior period, we have an estimate of time elapsed from first detection to clearance based upon the initial data.

Estimates of incident duration are compared for the period of MHCP operation and for the prior period for two different sets of incidents -- those blocking a traffic lane and all others. Two comparisons were done to take account of the difference in the mix of incidents observed by Metro Traffic Control and the broader set of incidents reported by the courtesy patrol.

As Figures 6.2 and 6.3 show, incident duration has decreased substantially since the implementation of the courtesy patrol program. For incidents blocking a lane of traffic, the average incident duration decreased by 10.5 minutes. For those not involving a traffic lane, the decrease was 8.6 minutes. This range will be used in the analysis to determine the savings in travel time attributable to courtesy patrol operation.

Figure 6.2 Estimated Duration of Incidents for Incidents in Traffic Lanes

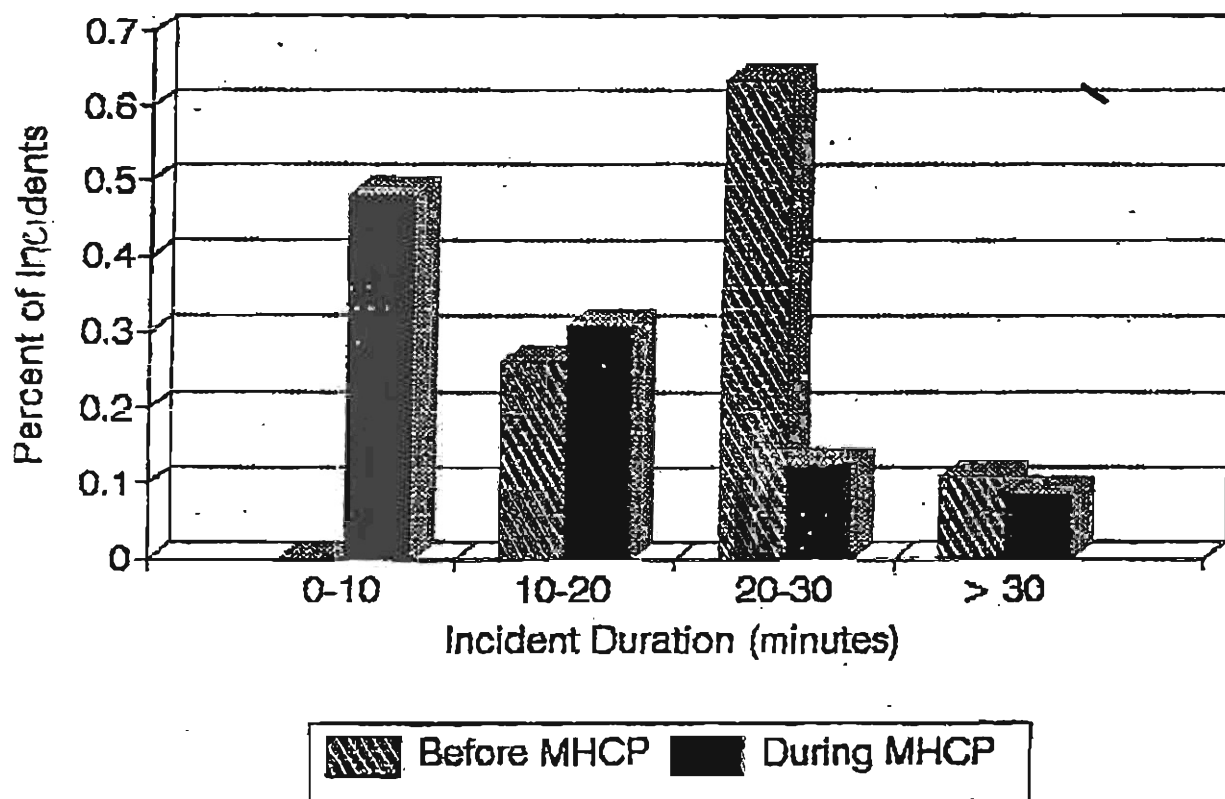
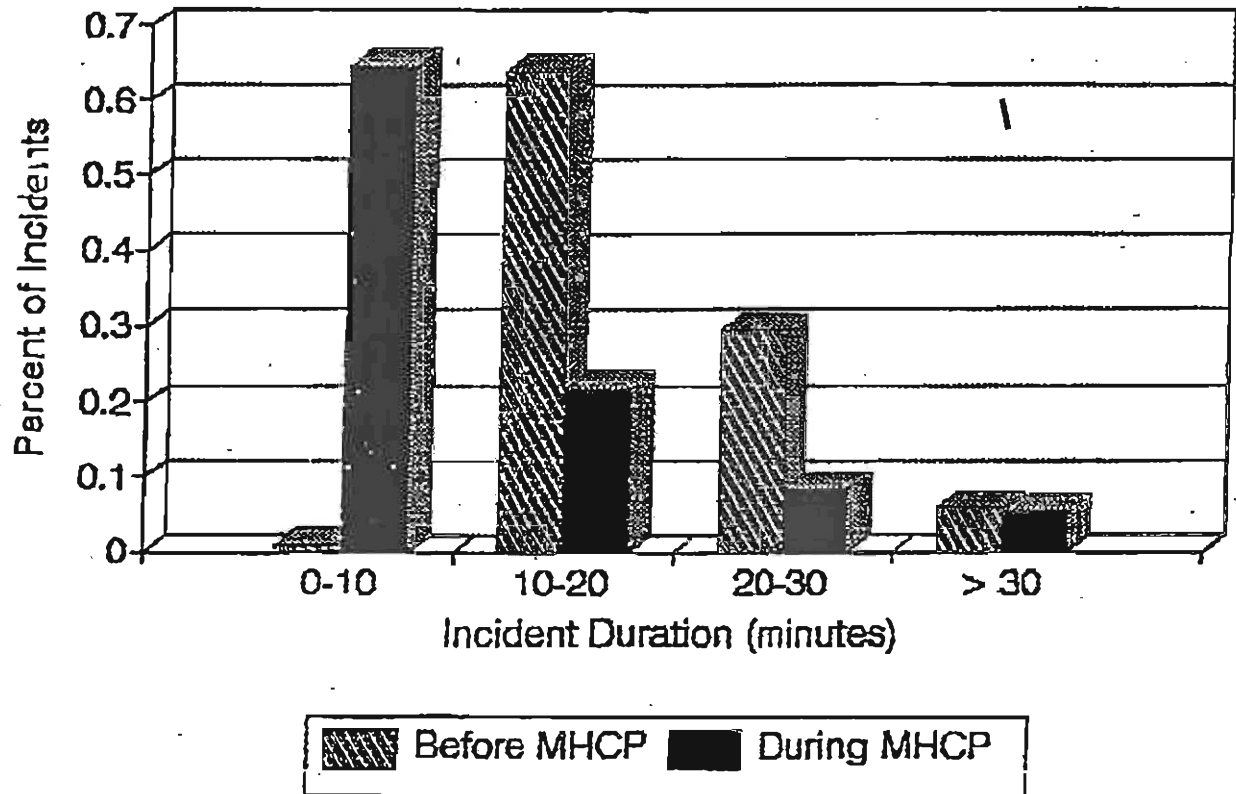


Figure 6.3 Estimated Duration of Incidents for Incidents Outside Traffic Lanes



Traffic Volumes: Traffic volumes are collected by the CDOT Region 6 (Denver metro area) traffic operations office. These data are reported for both five minute and one hour intervals at twelve counter locations both on the ramps and main traffic lanes. The University obtained the raw data for June through August 1992 on tape. After cleaning and editing the data, average traffic volumes were computed for each one hour segment of the morning and evening peak periods. These data are reported in Table 6.1.

In order to ensure conservative estimates of capacity reductions due to incidents, the model assumes a fairly high maximum saturation flow (MSF) rate of 2400 vehicles/hour for all lanes. This MSF exceeds the recommended ideal MSF of 2200 vehicles per hour for 70 MPH design speed freeways that is included in newly-revised chapters of the Highway Capacity Manual issued by the Transportation Research Board. We based this higher MSF estimate on discussions with a CDOT administrator who regularly observes maximum flows of this magnitude along this ramp metered section of I-25.

On a three lane road, any time volumes exceed 5000, one could expect delays to result even from a right shoulder stall. Most of the traffic volumes shown in Table 6.1. exceed this amount. On the far southern stretches, (south of Arapahoe), these volumes are only reached for a short time period in the morning. Courtesy patrol may not be warranted for the whole period on that stretch. On the other hand, the data suggest rather high volumes in the afternoon prior to 3:30.

Lane Blockages: An important factor in estimating vehicle delays is the fraction of highway capacity (maximum vehicle per hours flow rate) lost to lane blockage and driver slowdown near the incident location. Several reports suggest varying degrees of capacity reduction due to stalls and crashes depending in the location of the incident, severity of the incident, presence of emergency vehicles, number of blocked and unblocked lanes, width of lanes, and width of shoulders. The effects of these highway and incident characteristics (alone or combined) on total vehicle delay are not precisely known. Thus, it is best to report delay estimates for reasonable ranges of assumptions.

Estimates of percent capacity reductions on a 3-lane freeway caused by incidents blocking various lanes are available in the **Freeway Incident Management Handbook**. As was shown in table 2.1 of this report, an accident on a shoulder causes a 26% capacity reduction, or 0.8 of a lane. A stall or non-injury accident in a lane causes 48%-50% capacity reduction, or 1.5 lanes. An accident blocking two lanes causes 79% capacity reduction, or 2.4 lanes. The FHWA report did not distinguish between left and right shoulder incidents, although left shoulder incidents clearly cause greater capacity reduction. The FHWA report also did not give any indication of capacity reductions or delay effects due to incidents on ramps and in acceleration/deceleration (accel/decel) lanes.

The assumptions made in this analysis regarding capacity reductions as listed in table 6.2 are rather conservative, and are thus expected to produce low estimates of actual vehicle delays.

Table 6.1
Traffic Volumes Along I-25 by Hour
During Morning and Evening Peak Periods

Hour	I-25 Segments Defined by Exit								
	204	203	202	201	199	198	197	196	195
A.M.									
5-6	1179	1190	1207	1199	1595	1501	1538	1323	808
6-7	4995	5271	5078	4944	4915	4943	4588	3899	3172
7-8	6668	6857	6527	6422	7097	6986	7023	6488	5453
8-9	6187	6477	6198	6126	6113	5996	5499	4576	3627
9-10	5158	5310	5229	5164	5252	5012	4244	3428	2559
P.M.									
2-3	5178	5091	5074	5113	5817	5304	4432	3259	2296
3-4	5875	5788	5688	5809	6995	6313	5140	3775	2666
4-5	6185	6112	5976	6246	7682	6659	5478	4295	2964
5-6	6074	6028	5865	6149	7372	6319	5016	3873	2695
6-7	4836	4797	4687	4721	5616	5112	4115	3275	2208
Source: Ramp metering volume information from 6/1/92 thru 8/31/92 provided by Region 6, Colorado Dept. of Transportation and compiled by C.U. Denver's College of Engineering.									

The assumption of zero lane capacity reduction for incidents in accel/decel lanes and on ramp shoulders is not to imply that these incidents have negligible impacts. Rather, the traffic volume data for ramps is more limited, and the effects of these incidents on freeway traffic versus entering/exiting traffic is less clear. Thus, it was decided to exclude their impacts from this analysis. With regard to how much capacity is lost due to right shoulder incidents, results are shown for the two cases in which all right shoulder incidents (crashes and stalls) reduce capacity by 0.7 as shown above, versus only 0.1 lanes as a lower bound of minimal impact.

Table 6.2 Assumptions Regarding Capacity Reduction	
Incident Location	Lanes Lost
Left Shoulder	0.7
Left-most Lane	1.7
Left-Middle Lane	2.3
Right Middle Lane	2.3
Right-Most Lane	1.7
Accel/Decel Lane	0.0
Right Shoulder	0.7
Off-Road	0.3
Ramp Shoulder	0.0

Traffic Impacts: Discussion of Results

The following figures show estimated average vehicle delays of all incidents (stalls and crashes) served by the MHCP in the AM & PM peak-periods, respectively, during the evaluation period. The delays shown in these figures assume that time to clear an incident once emergency assistance arrives is independent of the incident detection and response time (i.e., time to clear incidents is not significantly different with and without MHCP). However, it may be that assistance and clearance times are generally lower as a result of having this special service operating.

Figures 6.4 & 6.5 show estimated average vehicle delays of all incidents (stalls and crashes) served by the MHCP in the AM & PM peak-periods, respectively, during the evaluation period. The incidents in these calculations exclude any consideration of abandoned vehicles. As with many other before/after or before/during comparisons, we are primarily interested in "differences" between average delays before and during MHCP. Figure 6.4 shows an average savings of 98 vehicle hours of delay for AM incidents, assuming that each right shoulder incident reduces capacity by 0.7 of a lane. Figure 6.5 shows an average savings of 75 vehicle hours of delay for PM incidents, with the same capacity reduction assumption. Although total traffic flow during the PM peak-period exceeds total traffic flow during the AM peak period, the mixture of accident times and locations during the AM peak-period made its estimated average delay and before/during difference greater than the PM period.

Figure 6.4 Average Vehicle Hours Delay Per AM
Peak-Period Incident

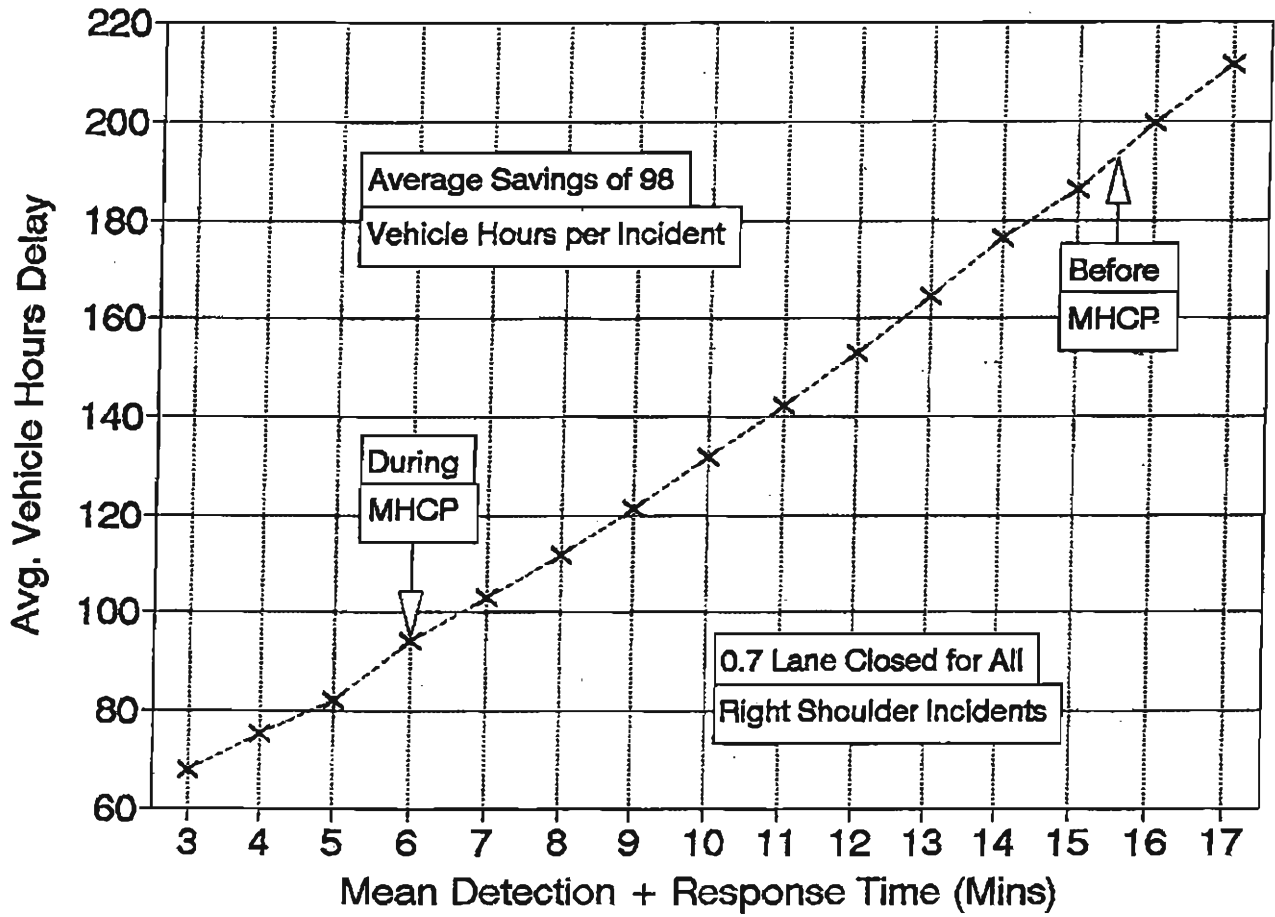
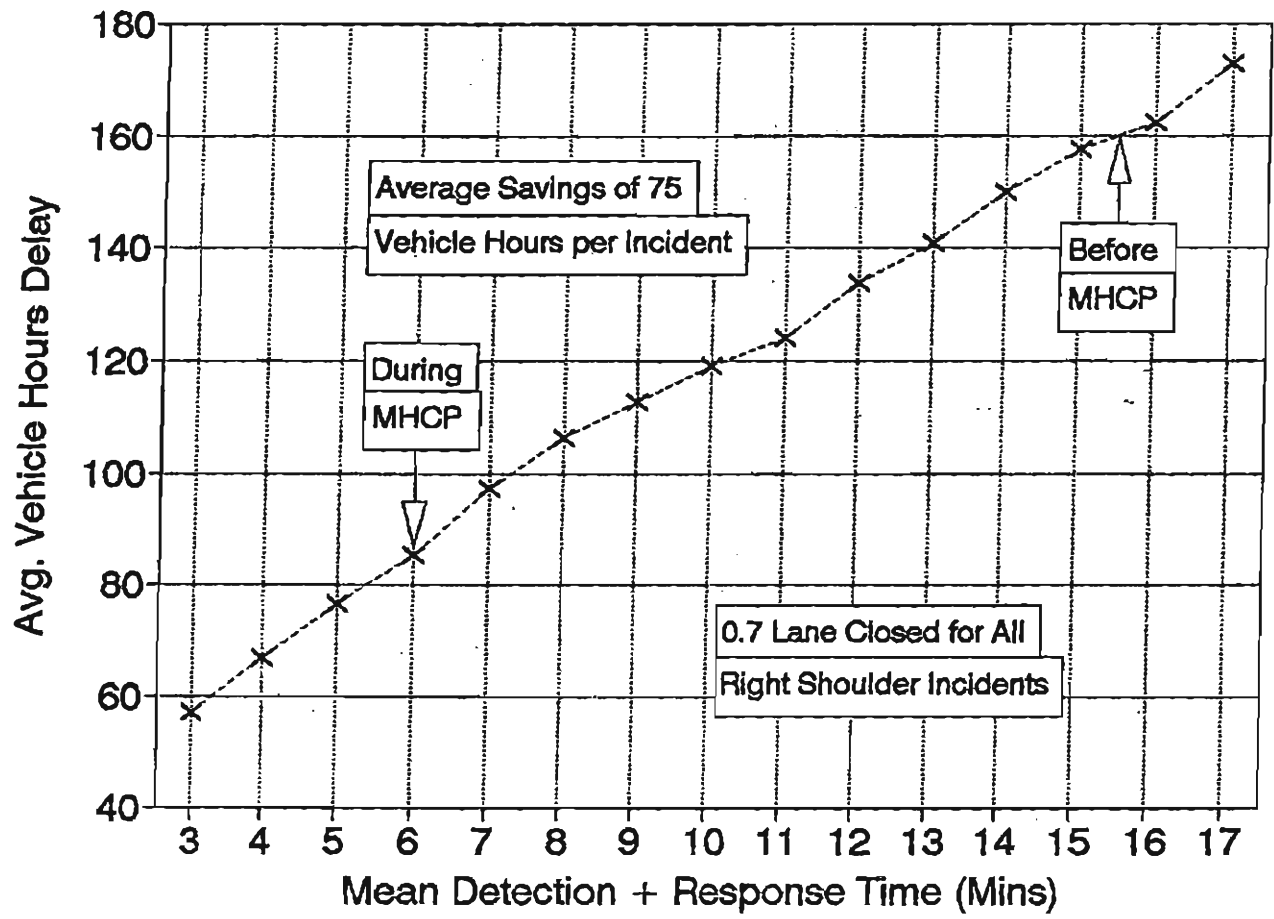


Figure 6.5 Average Vehicle Hour Delay Per PM
Peak-Period Incident



To examine the sensitivity of these average delay differences to the capacity reduction assumption for incidents located in the right shoulder, the same graphs are shown assuming that each crash or stall only reduces highway capacity by 0.1 of a lane versus 0.7 of a lane. Figure 6.6 shows an average savings of 78 vehicle hours of delay for AM incidents, assuming that each right shoulder incident reduces capacity by 0.7 of a lane. Figure 6.7 shows an average savings of 71 vehicle hours of delay for PM incidents, with the same capacity reduction assumption. Again, the mixture of accident times and locations during the AM peak-period made its estimated average delay and before/during difference in average greater than the PM period.

Applicability of Estimates to Entire Stretch of Roadway

The estimates shown above in Figures 6.4 through 6.7 may not present a fully accurate estimate of the overall savings realized from the MHCP program. We assume that our estimates are understated to the extent that higher traffic volumes occur closer to downtown than on the stretch of roadway which we were able to model due to the availability of traffic count data. On the other hand, the estimates assume the somewhat faster detection time that was typical of AAA vis a vis CSP.

These traffic impacts seem very large. On the other hand, we have tried to be conservative in most of our assumptions. Assumed capacity reductions associated with different types of incidents were assumed to be slightly less than suggested in most USDOT reports. We assumed no traffic delays associated with incidents in accel/decel lanes and ramps and excluded all abandoned vehicles. We varied the assumption regarding impacts of shoulder incidents. Only incidents that were cleared were included in the analysis. In addition, a high maximum saturation flow (MSF) rate of 2400 vehicles/hour was assumed for all lanes. The biggest uncertainty has to do with the incident clearance times that existed prior to implementation of the courtesy patrol. Even if the data collected from Metro Traffic Control overstated incident duration by 20%, the model shows that there would still be large reductions in traffic delays.

Traffic models can and will be improved. One of the report authors is currently involved in the development and testing of freeway and arterial traffic models to represent time-varying traffic conditions with and without incidents. Such models, when adequately implemented and validated for a freeway corridor such as I-25, are expected to yield more accurate estimates of traveler delays due to incidents, including route diversion effects.

Link to Qualitative Assessments

In interviews regarding program operation, metro area traffic reporters indicated that the courtesy patrols were effective in their judgement in improving traffic flows and reducing delays.

Figure 6.6 Average Vehicle Hours Delay Per AM
Peak-Period Incident

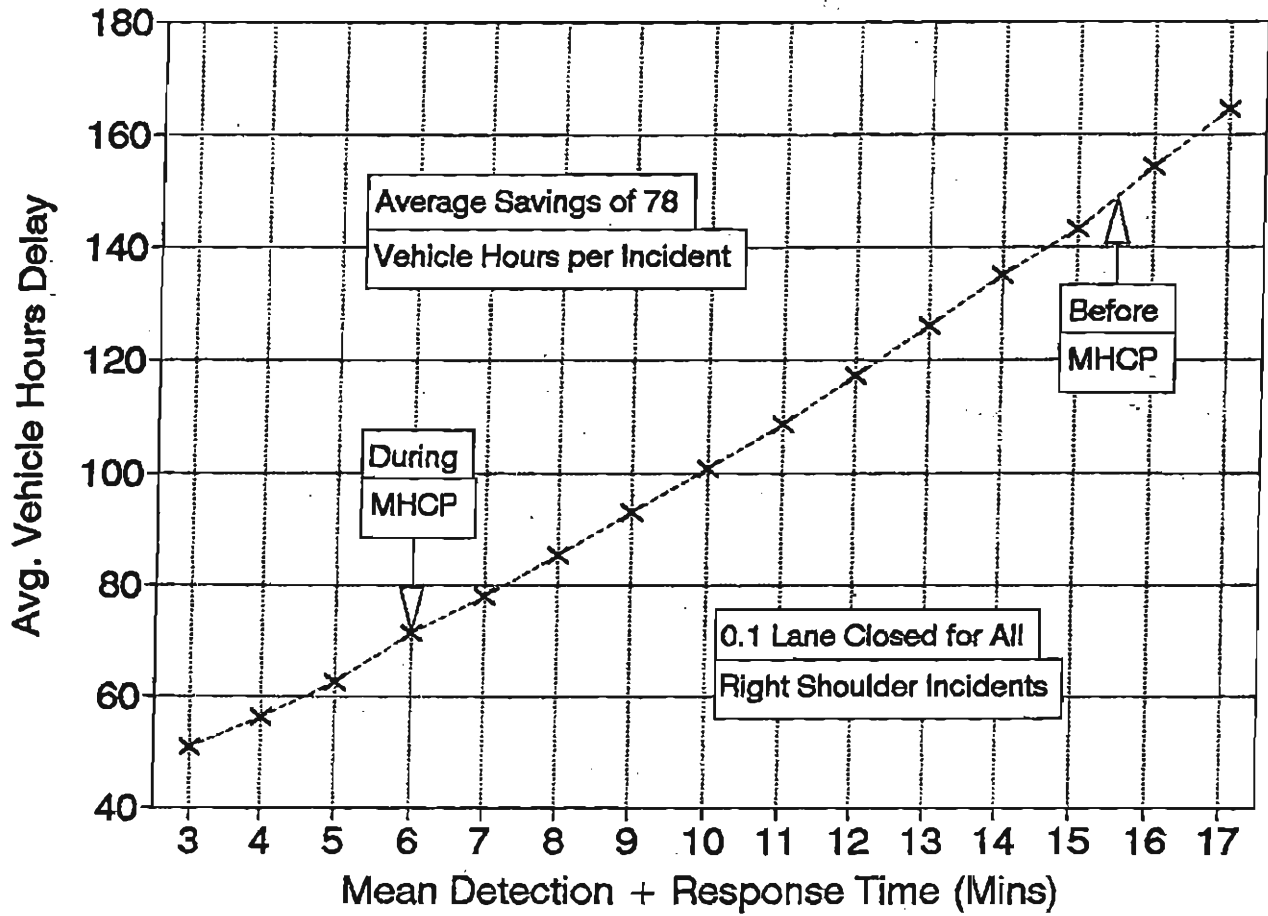
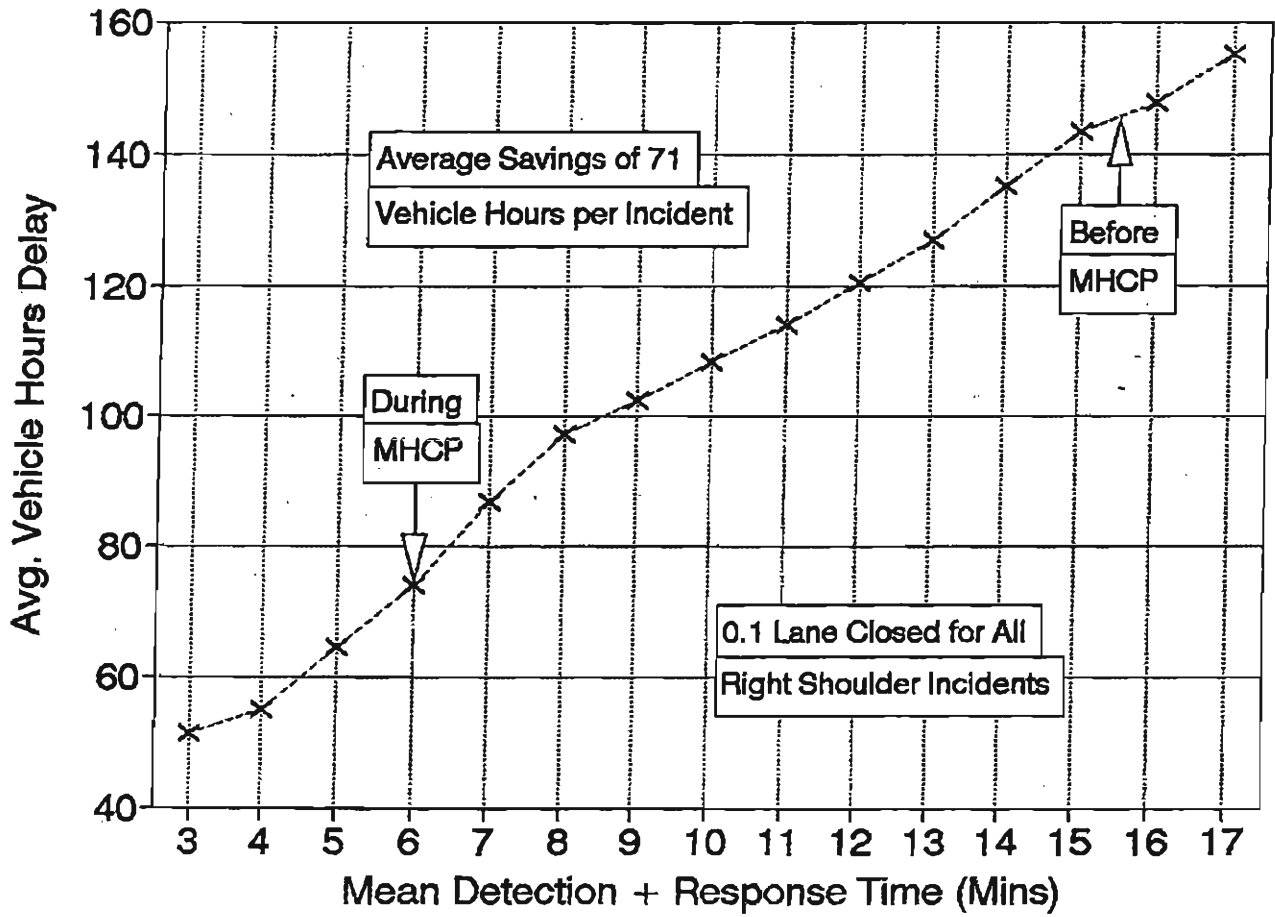


Figure 6.7 Average Vehicle Hours Delay Per PM
Peak-Period Incident



CHAPTER 7

Conclusions and Recommendations

Cost-Benefit Analysis

The courtesy patrol offers substantial benefits in terms of reduced traffic congestion. This was shown in Chapter 6. Before concluding the program is a success, however, benefits must be compared with costs. Investments having positive benefit/cost ratios are economically efficient.

To do a benefit/cost analysis, the monetary value of reducing traffic delays must be estimated. The value of time saved by persons and goods due to better incident management depends on the average occupancies of passenger cars and transit vehicles, the wage earning impacts on those persons, and the value of goods in transit. Accounting for all of these factors in an approximate manner, the value of time often applied in impact analyses of transportation projects in urban areas is \$10 per vehicle hour.

Using this figure, it appears that the courtesy patrol saved motorists between \$1.8 and \$2 million worth of time over its six months of operation. This analysis is detailed in Table 7.1. In addition, disabled motorists received services of substantial value.¹⁴

Table 7.1 Detail of Benefit/Cost Analysis		
	AM	PM
Number of Incidents - 6 months	1095*	1273*
Estimated Hours of Traffic Delay Averted Per Incident		
High	98	75
Low	78	71
Estimated Dollars Savings from Reduced Traffic Delay		
High	\$1,073,100	\$954,750
Low	\$854,100	\$903,830
Estimated Costs (6 patrols)	\$120,000 - \$168,000	
Benefit Cost Ratio	16.9	
High	10.5	
Low		

* These figures are low due to missing time data.

¹⁴ Approximately 900 motorists received direct services that solved their problem. Some number of these would have required tow services.

The courtesy patrol program cost approximately \$120,000 to operate over the same period. For a high estimate of costs, we have applied CSP's true total cost per hour and applied it to all six patrols. Either way, benefits exceed costs by a very substantial margin. Indeed the ratio of benefit to cost is in the range of 10.5 or 16.9 to one.

Recommendations

The courtesy patrol, with its excellent ratio of benefits to costs, should be established on a permanent basis.

The more intensive deployment of resources that characterized the southern segment of roadway served is economically justified. The contract with AAA required the deployment of 4 patrols, on two routes averaging 7.5 center lane miles. This was significantly shorter than the 12 mile route assigned to the Colorado State Patrol. Both assignments were within the parameters recommended by the Towing and Recovery Association of America which suggested a beat should be five to fifteen miles in length. Experience during the pilot project suggests that shorter lengths make sense particularly on stretches with many lanes, limited shoulders and high volumes. The evaluation documented that more intensive deployment leads to shorter detection and response times. There was a difference of 1.8 minutes in response time between CSP and AAA. Assuming average speeds and distances travelled, we can impute a difference in detection time of three to four minutes. The figures presented in Chapter 6 allow an estimate of the impact on traffic of longer detection/response times. With the longer times typical of CSP, the savings in traffic delays (relative to the before period) per incident drops substantially. On the other hand, the number of incidents served per patrol unit increases. The ratio of benefits to costs appears higher when the shorter segments are assigned to the courtesy patrol.

CDOT should consider operating the courtesy patrol during more hours. While volume data were not calculated for the whole day, it appears that volumes in the early part of the afternoon are sufficiently high to justify running the patrol. More analysis of traffic volumes should be undertaken to assess whether all-day operation is justified on I-25.

CDOT should consider operating the courtesy patrol on other stretches of roadway where volumes approach design capacity or where roadway configuration compounds the traffic delay effects of incidents (i.e. where shoulders are narrow or non-existent). The benefit/cost ratios are so high, careful examination of other roadways is warranted to determine whether they are similar in circumstance to the I-25 and I-70 corridors where the courtesy patrol has operated effectively. Attention should focus on additional stretches of I-70, I-225, I-6 and the Boulder Turnpike.

While more difficult to administer, CDOT should consider deploying a courtesy patrol

on additional roadways or hours to accommodate traffic demands associated with special events.

Table 7.2 Results Associated with Alternative Deployments of Courtesy Patrol Units		
	Assumption 1 (based on CSP)	Assumption 2 (based on AAA)
Center Line Miles Per Unit	6	3.75
Incidents Per Unit	529	395
Assumed Response/Detection Time	10	5.8
Traffic Delays Averted Relative to Prior Period	55	102
Benefits of Averted Traffic Delays	\$290,950	\$402,900
Benefit Cost ratio	14.6	19.5
Note: The ratio is high in both instances since estimates are based on Figure 3 (the model run showing the highest impacts). In this case, however, it is the differential being focused on and the results would be similar using any of the figures. Also, the cost estimates assume that the program has been implemented on a permanent basis and CSP officers are paid regular time as opposed to overtime wages.		

All courtesy patrols should be equipped with a roll jack. AAA-operated courtesy patrols cleared incidents involving flat tires in a significantly shorter time than CSP. Since tow trucks are rarely used to jack up vehicles, the difference is probably attributable to the use of different jacks. CSP tends to rely on the jack carried in the disabled vehicle. Use of these is less efficient than roll jacks that can be used with most vehicles.

Training should be provided to courtesy patrol operators. All operators should be trained regarding program policies and procedures, minor vehicle repair, customer service, and roadside service safety. In addition, since the courtesy patrol may be the first to arrive at the scene of an accident, consideration should be given to providing "first responder" training, typical of that now provided to law enforcement officers.

It is difficult to conclude with any certainty whether it is better to implement the program using a private tow service or the Colorado State Patrol. There are advantages and disadvantages of each model.

If the permanent program is implemented via contract with a private tow operator, CDOT must have a clear process for contractor selection. In addition, CDOT must be prepared to devote additional resources to contract monitoring

and supervision. CSP appeared to provide more reliable delivery of service. The number of incidents handled was roughly similar from week to week. For AAA, on the other hand, there was a considerable drop-off in the number of incidents served in the latter part of the initial pilot program. During the extended program, AAA showed a significant recovery in performance. There appears to be no explanation why this occurred.

CSP, with its use of four wheel drive vehicles, took slightly longer to clear most categories of incidents. The difference in time appears to be about one minute on average. The extra costs associated with tow trucks can probably be justified in terms of benefits. A minute added to service time increases traffic delays by an average of 5 to 10 vehicle hours. The difference in equipment costs (of about \$10 per hour) can be justified even if only one incident were served per hour. In fact the typical patrol unit serves more than three incidents per hour. Use of a tow truck is especially warranted in stretches of roadway lacking shoulders since in these instances it is more difficult for a courtesy patrol equipped with push bumper to move the disabled vehicle to a place with minimal impacts on traffic flow. **A more carefully controlled test is warranted to determine the benefits of using tow trucks vs. four wheel drive vehicles equipped with push bumpers. Ideally, equipment should be rotated on the same stretch of road using the same type of personnel.**

CSP, with its uniformed law enforcement officers, offers some advantages in certain situations -- most notably accidents. On the other hand, there is a significant differential in labor cost -- more than \$20 per hour during the pilot program. The difference need not be as large as it is under current contractual arrangements. **If CDOT decides the Colorado State Patrol should continue to operate the program, it must arrange for an increase in FTE and inclusion of courtesy patrol responsibilities in regular scheduling. There is no justification for paying time and a half to state patrol officers for courtesy patrol functions.**

A third option that the state should consider is using CDOT personnel and equipment to provide the service. If staffing patterns are predictable and the program is to be operated permanently, there are no reasons not to do the program in-house.

Clear policies should be in place regarding procedures for calling secondary tow service. The courtesy patrol should not provide tows to any place other than a designated drop site. It should not recommend a secondary tow service or a repair/body shop. If a secondary tow service is called, it should be based on the specific request of the disabled motorist or be according to a clearly specified procedure that determines how or what tow company should be called. A clear procedure should result in less opposition by private tow operators.

The state should consider revamping its law governing abandoned vehicles. The law should be rewritten to facilitate the removal of vehicles from the roadway in shorter periods of time. On congested roads, even vehicles parked off the road can have an impact on

traffic flows. The courtesy patrol should be given discretion to move abandoned vehicles in traffic lanes. Also, consideration should be given to providing the courtesy patrol the authority to "red-tag" abandoned vehicles. This would relieve law enforcement officers of this task. Furthermore, the sooner a vehicle is tagged, the more quickly it is likely to be removed from the road.

APPENDIX I: DATA COLLECTION FORMS

**Colorado Dept. of Transportation
Courtesy Patrol Pilot Program
(Northern Segment)**

A. Date: (M-D-Y)	B. Operator #:	C. Call #:	D. Call Time:	E. How Detected:
	F. License #	G. # Vehicle Occupants:	H. Arrival Time:	
	State		AM PM	Dispatcher 1 Metro Traffic 2 Police Scanner 3 Courtesy Patrol 4 Traffic Ctrl. Supt. 5

I. Vehicle Type:	J. I-70 Going	E W	I-25 Going:	S N	K. Vehicle Position:
Car 1	Approaching Exit:		Approaching Exit:		Left Shoulder 1
Pickup/van 2	272 Federal Blvd.		210B 17th Ave., 19th Ave.		Left Lane 2
Single unit truck 3	273 Pecos Street		210C Auraria Parkway		Middle (left) 3
Combination Truck 4	274A I-25 SB		211 23rd Avenue		Middle (right) 4
Vehicle w/trailer 5	274B I-25 NB		212A Speer Blvd. SB		Right Lane 5
Bus 6	275A Washington Street		212B Speer Blvd. NB		Accel/Decel 6
Motorcycle 7	275B Brighton Blvd.		212C 19th Ave., 32d Ave.		Right Shoulder 7
Multiple vehicles 8	275C York Street		213 38th Ave., 23rd St.		Off Shoulder 8
			214A I-70 EB		(More than 6 ft. from traffic lane)
			214B I-70 WB		Exit/Entrance Ramp 9
			214C 48th Ave., 49th Ave.		Ramp Shoulder 10
			215 58th Ave.		
			216 I-76 EB		
			217 Boulder, Westminster		
			219 84th Ave.		
L. Trouble:	M. Service:		N. Vehicle Movement:		O. Vehicle Movement (if 2 moves occur)
Flat Tire 1	Fixed Tire 1		From:		From:
No Gas 2	Gave Gas 2		Lane of Traffic 1		Shoulder 2
Radiator 3	Gave Water 3		Shoulder 2		Off Road 3
Other Mechanical 4	Other Mechanical 4		Off road 3		
Accident 5	Tow/Moved Vehicle 5		To:		To:
Debris on Road 6	Protected Scene 6		Shoulder 1		Off Road 2
Abandoned Vehicle 7	Called Help 7		Off Road (At least 6 Ft. from traffic lane) 2		Safe site (off freeway) 3
Other 8	Moved Debris 8		Safe Site (Off Freeway) 3		Resumed Travel 4
	Service Refused 9		Resumed Travel 4		
	Other 10		By:		By:
			Courtesy Patrol 1		Courtesy Patrol 1
			Driver 2		Driver 2
			Other 3		Other 3
			Time: AM PM		Time: AM PM

P. Other Assistors:	Law Enf.	Priv. Tow	Q. Traffic Conditions:	R. Weather Conditions:	S. Are other incidents in view?	T. Departure Time:
Already On Scene 1	1	1	Free flowing 1	Clear 1	No 1	AM PM
Arrived Later 2	2	2	Slow 2	Rain 2	Ahead 2	Was incident cleared?*
Not Involved 3	3	3	Gridlock 3	Snow 3	Behind 3	Yes 1
Any Other:					Opposing 4	No 2

*NOTE: AN INCIDENT IS CLEARED ONLY IF:

1. THE CAR RESUMED TRAVEL, OR
2. THE CAR HAS BEEN MOVED OFF THE FREEWAY, OR
3. THE CAR REMAINS ON THE FREEWAY, BUT IS AT LEAST 6 FEET FROM THE TRAFFIC LANE AND IN YOUR JUDGMENT IS NOT DISRUPTING TRAFFIC.

**Colorado Dept. of Transportation
Courtesy Patrol Pilot Program
(Southern Segment)**

A. Date: (M-D-Y)	B. Operator #:	C. Call #:	D. Call Time: AM PM	E. How Detected:
	F. License # State	G. # Vehicle Occupants:	H. Arrival Time:	Dispatcher 1 Metro Traffic 2 Police Scanner 3 Courtesy Patrol 4

I. Vehicle Type: Car 1 Pickup/van 2 Single unit truck 3 Combination Truck 4 Vehicle w/trailer 5 Bus 6 Motorcycle 7 Multiple vehicles 8	J. I-25 Going: S N Approaching Exit: 195 County Line Road 196 Dry Creek Road 197 Arapahoe Road 198 Orchard Road 199 Bellevue Avenue 200 I-225 201 Hampden Avenue 202 Yale Avenue 203 Evans Avenue 204 Colorado Boulevard	205A NB University Blvd. 205B SB University Blvd. 206A Downing Street 206B Washington/Emerson 207A Broadway/Lincoln 208 Alameda Avenue 209A EB 6th Avenue 209B WB 6th Avenue 209C 8th Ave/Zuni 210A Colfax/Lawrence 210B 17th/19th Ave. 210C Auraria Parkway	K. Vehicle Position: Left Shoulder 1 Left Lane 2 Middle (left) 3 Middle (right) 4 Right Lane 5 Accel/Decel 6 Right Shoulder 7 Off Shoulder 8 Exit/Entrance Ramp 9 Ramp Shoulder 10
L. Trouble: Flat Tire 1 No Gas 2 Radiator 3 Other Mechanical 4 Accident 5 Debris on Road 6 Abandoned Vehicle 7 Other 8 _____ _____ _____	M. Service: Fixed Tire 1 Gave Gas 2 Gave Water 3 Other Mechanical 4 Tow/Moved Vehicle 5 Protected Scene 6 Called Help 7 Moved Debris 8 Service Refused 9 Other 10 _____ _____ _____	N. Vehicle Movement: From: Lane of Traffic 1 Shoulder 2 Off road 3 To: Shoulder 1 Off Road 2 Safe Site (Off Freeway) 3 Resumed Travel 4 By: Courtesy Patrol 1 Driver 2 Other 3 Time: AM PM	O. Vehicle Movement (if 2 moves occur) From: Shoulder 2 Off Road 3 To: Off Road 2 Safe site (off freeway) 3 Resumed Travel 4 By: Courtesy Patrol 1 Driver 2 Other 3 Time: AM PM

P. Other Assistors: Law Enf. Priv. Tow Already On Scene 1 1 Arrived Later 2 2 Not Involved 3 3 Any Other:	Q. Traffic Conditions: Free flowing 1 Slow 2 Gridlock 3	R. Weather Conditions: Clear 1 Rain 2 Snow 3	S. Are other incidents in view? No 1 Ahead 2 Behind 3 Opposing 4	T. Departure Time: AM PM Was incident cleared? Yes 1 No 2
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APPENDIX 2: PUBLIC RELATIONS MATERIALS

Courtesy Patrol Brochure - Front



Mile High
Courtesy
Patrol
(Pilot Program)

Courtesy Patrol Brochure Inside

The Courtesy Patrol Program is a six month pilot program sponsored by the Colorado Department of Transportation (CDOT). The intent of the program is to provide assistance to motorists and reduce traffic congestion caused by vehicle breakdowns. Studies have shown that for every minute a disabled vehicle blocks a travel lane, four minutes of delay are created for motorists. The rapid removal of disabled vehicles is essential in reducing freeway congestion.

If your vehicle breaks down within the patrol area, a courtesy patrol operator will move your vehicle from the travel lanes. The courtesy patrol can then provide you with any of the following services *free of charge*.

- ✓ Provide one gallon of fuel
- ✓ Change a flat tire
- ✓ Jump start your car
- ✓ Fill radiator with water

If the courtesy patrol cannot get your vehicle running, your vehicle may be relocated to a designated safe site, if accessible. The courtesy patrol can further help you by calling a friend, relative or tow truck for additional assistance.

Hours of Operation:

Monday - Friday (Holidays Excluded)
6:00 AM to 9:00 AM
3:30 PM to 6:30 PM

Courtesy Patrol Area

(See Map on Back)

I-25 From: County Line Rd.
To: 84th Ave.
I-70 From: Washington St.
To: Federal Blvd.

CDOT wants all motorists to get to their destinations safely and in a timely manner. We hope that this program has provided you with a valuable service. Please take a few minutes to fill out the attached mail-in card. Your opinion and comments on the program are very important to us.

Participating Agencies

Colorado Department of Transportation
Colorado State Patrol
American Automobile Association
Metro Traffic Control

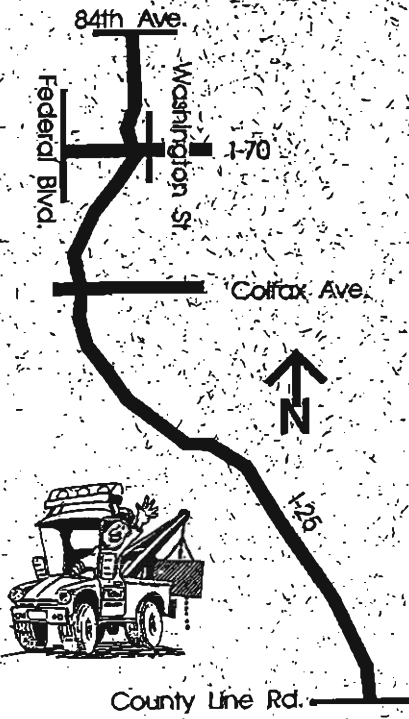
Please detach
and mail in.



Call Number	Date	Time	Location	Name (Optional)	Phone (Optional)
Type of assistance provided.					
Were you satisfied with the services you received? Yes ☐ No ☐					
Do you think this program is a good use of your tax dollars? Yes ☐ No ☐					
Please explain.					
Is there anything we can do to improve this program?					
Comments					

Courtesy Patrol Brochure - Back

For Additional Information
Please Call 757-9228
Mile High Courtesy Patrol



STATE OF COLORADO

DEPARTMENT OF TRANSPORTATION

4201 East Arkansas Avenue
Denver, Colorado 80222
(303) 757-9011



FOR IMMEDIATE RELEASE

August 27, 1992

The Colorado Department of Transportation (CDOT) will initiate a six-month pilot program of providing free emergency road service during rush hours on sections of I-25 and I-70 in metro Denver. The service will begin Monday morning, August 31.

"Chicago has its Minutemen. Los Angeles has its Orange Angels. Now Denver will have the Mile High Courtesy Patrol on its major freeways," stated A. Ray Chamberlain, CDOT executive director.

Establishing a courtesy patrol was identified as a top priority by the Colorado Incident Management Coalition, established last September by CDOT with the cooperation of the Denver Regional Council of Governments (DRCOG). The Coalition's goal is to reduce freeway congestion and improve safety.

"The Coalition has been evaluating successful incident response plans implemented by other cities and will recommend the best solutions for Denver," said George Scheuernstuhl, DRCOG transportation director and chairman of the Incident Management Coalition. "Testing a courtesy patrol in Denver became the Coalition's number one recommendation after reviewing successful operations in other cities."

Other recommendations will be announced during a meeting of the entire Coalition scheduled on September 23.

-- more --

The vehicles for the Mile High Courtesy Patrol will be provided under contracts with AAA Colorado and the Colorado State Patrol. To improve the detection and removal of stalls, Metro Traffic Control will coordinate communications with the rescue vehicles.

All metro area radio and television traffic reporters will be encouraged to report stalled vehicles by contacting either the State Patrol or Metro Traffic Control.

"Of all the freeway incidents recorded by police departments nationwide, the vast majority, 80 percent, are stalled vehicles," Chamberlain said. "For every minute a vehicle blocks traffic, it can take four minutes for traffic to return to normal. Rapid removal of stalls is essential to reduce congestion which has a definite impact on air quality."

The Courtesy Patrol will provide the following services free of charge:

- * Provide one gallon of unleaded fuel.
- * Change a flat tire.
- * Jump start a vehicle with a dead battery.
- * Fill the radiator with fluid.

If the vehicle cannot be driven, the Courtesy Patrol will attempt to push or tow the vehicle to a safe area out of traffic. To provide further assistance, the Patrol operator will try to contact a friend, relative or tow truck company requested by the driver of the disabled vehicle.

-- more --

Courtesy Patrol - page 3

The Courtesy Patrol will operate on I-25 between County Line Rd. and 84th Ave. and on I-70 between Washington St. and Federal Blvd. Six vehicles will be on the lookout for stalls and provide assistance from 6 to 9 a.m. and 3:30 to 6:30 p.m. Monday through Friday, except holidays.

"Public comment is critical during the six-month pilot program," Scheuernstuhl said. "Drivers are urged to return the postage-paid comment cards provided at the time of assistance. Their suggestions and comments will be invaluable."

The informational brochures and comment cards will be available in English and Spanish.

The University of Colorado at Denver (UCD) will evaluate the pilot program and assess which patrol vehicles are most efficient. AAA will operate tow trucks while the State Patrol will run cars especially equipped to handle breakdowns.

UCD will collect data from Courtesy Patrol operators, Metro Traffic Control reporters and CDOT's freeway ramp metering system to determine if the effort has a positive impact on congestion.

"If the evaluation is positive, we will try to find permanent funding for the patrol," Chamberlain said. "Since funds to expand freeways are limited, incident response is more important than ever before. We used to be in the business of building new freeways. Now we are in the business of managing them more effectively."

-- more --

Courtesy Patrol - page 4

The cost of providing the service for six months will be \$120,000 with about 90 percent of the funding provided by the Federal Highway Administration (FHWA).

#

CONTACT: DAN HOPKINS, 757-9469

Colorado gives Courtesy Patrol the green light

Pilot program starting Monday to aid rush-hour drivers with problems on I-25, I-70 in Denver area

By John Sanko

Rocky Mountain News Capitol Bureau

Rush-hour motorists who run into problems on the two major interstate highways crisscrossing Denver can expect to get a friendly — and free — helping hand beginning Monday.

The Colorado Transportation Department is launching a six-month pilot program called Courtesy Patrol to get harried motorists out of trouble, as well as to reduce congestion and to increase safety.

"Chicago has its Minutemen," said department director A. Ray Chamberlain. "Los Angeles has its Orange Angels. Now Denver will have the Mile High Courtesy Patrol on its major freeways."

Chamberlain and other officials gathered in the parking lot outside of McNichols Arena on Thursday to announce the project and to show off four tow trucks and two Colorado State Patrol cars with "push bumpers" that will be used in the program.

The program was the brainchild of a special coalition created last September with the Denver Regional Council of Governments to develop ways to reduce highway congestion and to make commuter driving more safe.

"Testing a Courtesy Patrol in Denver became the coalition's No. 1 recommendation after reviewing successful operations in other cities," said DRCOG transportation director George Scheuernstuhl, who chaired the coalition.

"For every minute a vehicle blocks traffic, it can take four minutes for traffic to return to normal."

A. Ray Chamberlain
*Colorado Transportation
Department*

Free services that the Courtesy Patrol will offer include: providing up to one gallon of unleaded fuel, changing flats, jump starting vehicles with dead batteries and filling the radiator with fluid. If the vehicle cannot be driven, the patrol will try to push or tow it.

"Of all the freeway incidents recorded by police departments nationwide, the vast majority, 80%, are stalled vehicles," Chamberlain said. "For every minute a vehicle blocks traffic, it can take four minutes for traffic to return to normal."

The vehicles for the patrol will be provided under contracts with AAA Colorado and the Colorado State Patrol. They will operate on Interstate 25 between County Line Road and 84th Avenue and on Interstate 70 between Washington St. and Federal Blvd. from 6 a.m. to 9 a.m. and from 3:30 p.m. to 6 p.m. on weekdays.

All but 10% of the \$120,000 cost of the six-month program is being provided by the Federal Highways Administration. A team from the University of Colorado at Denver will evaluate the work at its conclusion.

New patrols seek to unsnarl freeways

by Mary George
Denver Post Environment Writer

Coming Monday to a freeway traffic jam near you: Fire-engine-red tow trucks or State patrol four-wheelers to get motorists out of trouble.

The six vehicles make up the new Mile-Hi Courtesy Patrol charged with moving stalled and easing rush-hour jams.

"Of all the freeway incidents recorded by police departments, . . . 80 percent are stalled ve-

hicles," said Ray Chamberlain, executive director of the Colorado Department of Transportation.

"For every minute a vehicle blocks traffic, it can take four minutes for traffic to return to normal," he said.

The courtesy patrol, patterned after successful traffic teams such as the Chicago Minute-men and the Los Angeles Orange Angels, begins a six-month, \$120,000 trial run next week.

The federal government will pay 90 percent

of the bill; state government the remaining 10 percent.

The drivers will hunt for stalls on Interstate 25 between County Line Road and 84th Avenue, and on Interstate 70 between Washington Street and Federal Boulevard. The four tow trucks and two four-wheel drives will patrol from 6 to 9 a.m. and 3:30 to 6:30 p.m., Monday through Friday except holidays.

Please see STALLS on 4B



The Denver Post / John Prieto

MOTORISTS' FRIEND: Vehicle will provide emergency road service during rush hours

on parts of I-25 and I-70 under pilot program being initiated in the Denver area.

New courtesy patrols to aid motorists so traffic can flow

STALLS from Page 1B

They'll have gasoline, radiator fluid and jumper cables at the ready. If necessary, they'll use their vehicles to push or tow a disabled car to a safe area, then help change a flat, tape a blown hose or order a private tow truck. And there will be no charge to motorists.

Most rush hours are marred by at least one traffic jam that could be eased by such speedy help, and yesterday morning was no exception, said Brian Jordon, operations director for Metro

Traffic Control, which coordinates radio and TV traffic reports.

"About 7:45 a.m. at southbound I-25 at I-76, the state patrol was with a stall . . . and they stayed with them quite a while," Jordon said.

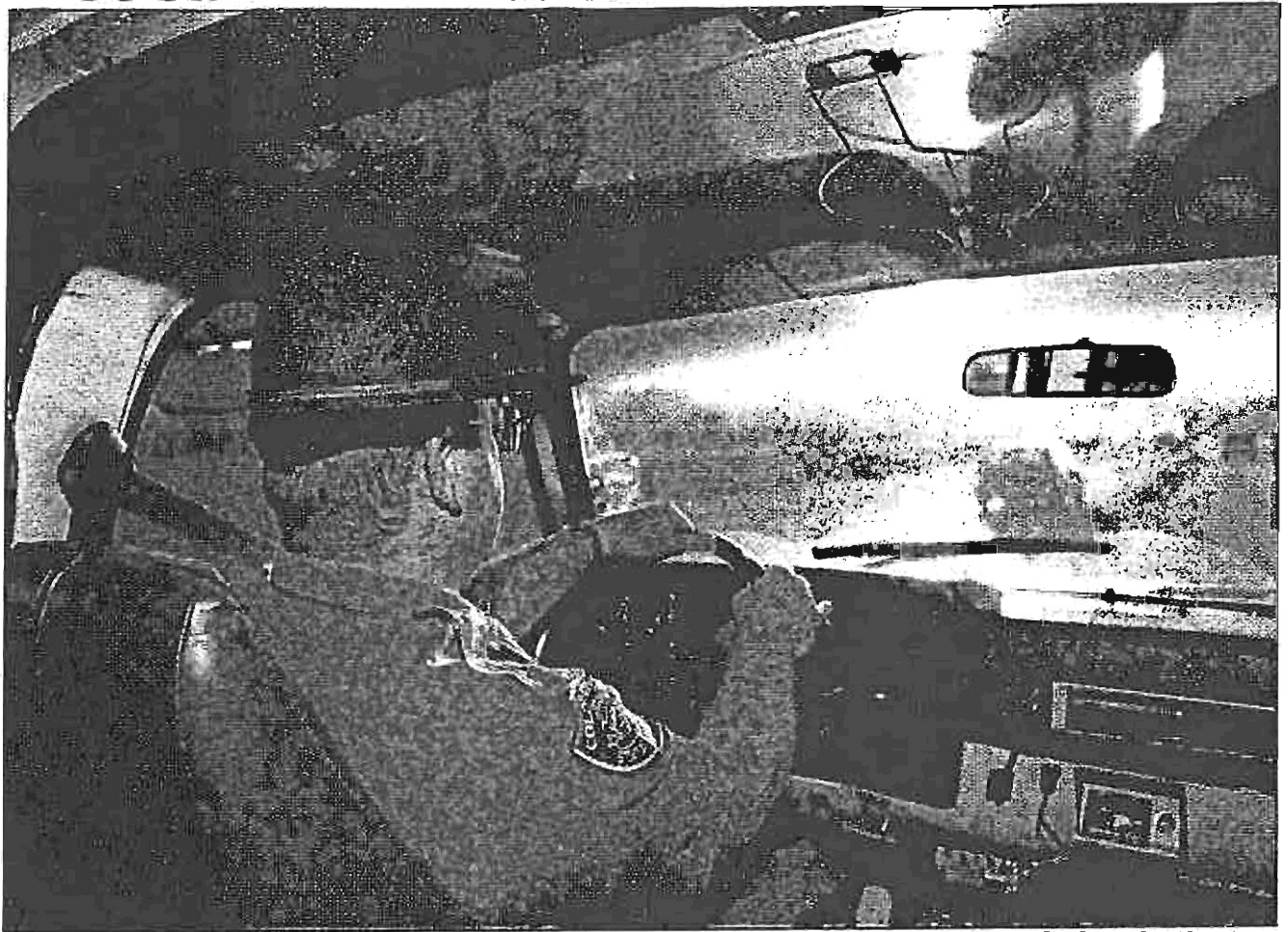
"If the courtesy patrol had come along and whisked them away, we wouldn't have had traffic jammed up past 84th Avenue after 8 a.m.," he added.

The courtesy patrol is the first of several forthcoming traffic management options aimed at improving rush hour without the

hassle and expense of building new road lanes. Those will include cellular phone networks, dedicated radio frequencies and coordination of police and fire departments across jurisdictions.

During the next six months, traffic officials will watch average highway speeds, monitor feedback from stalled motorists and traffic reporters and check the merits of the tow trucks against the four-wheel drives.

If the patrol gets good grades, Chamberlain said, it will become permanent.



The Denver Post / Lyn Ahweis

Trooper Jerry Haan drives metro freeways searching for motorists in need of help. **STORY, 4B** Tues. 9/1/92.

Courtesy cops assist troubled drivers

By Steve Lipsher

Denver Post Staff Writer

Taillights flared red, and four lanes of traffic that had been flowing briskly abruptly slowed to a trickle.

"Southbound I-25 into the Mousetrap is bunching up, and sunshine is causing slowing on eastbound highways," the cheery voice on the AM radio station announced.

But as hundreds of metro-area motorists exhausted their vocabularies at the delays during yesterday morning's rush hour, help — in the form of trouble-shooting tow trucks and Colorado State Patrol 4-wheel-drive vehicles — finally was on the way.

"We've got water if they need

water, jumper cables, a gas-transfer kit we can hook right up to our gas line," explained Trooper Jerry Haan, one of six officers patrolling Interstate 25 from County Line Road to 84th Avenue and Interstate 70 through the Mousetrap as part of the "Mile High Courtesy Patrol."

What's more, he said, the scout cars can summon tow trucks and push disabled vehicles off the roads and clear the way for other drivers.

"We have adjustable push bumpers," Haan said. "We can push just about any vehicle. Those VW bugs are about the only exception" because of their low bumpers.

Yesterday marked the first day of the courtesy patrol, which provides roving roadside assistance free to stranded and stalled motorists. The federal government pays 90 percent of the costs, and the state contributes 10 percent.

"The courtesy patrol is out doing their job, and they've got the tire

changer off," the radio deejay reported, referring to a car with a flat tire that had been moved from the highway.

"Meanwhile, on southbound I-25 at 38th on the right shoulder we have a stall."

Overhead, a traffic helicopter circled like a vulture, marking the next road kill.

Haan pulled behind a brown Ford Gran Torino on the shoulder of I-25, its hood and trunk open like vestigial wings.

Beneath the hood, driver James Vermillion's grime-covered hands capably repaired a ruptured heater hose, sending Haan back on his way with a thank you.

"I kind of like all this attention," Vermillion said.

Denver's six-month pilot program is modeled after similar ones in a dozen other major cities. And in all, yesterday's start was successful, helping a dozen or so motorists during an unusually uneventful rush hour.



George Kochanec Jr./Rocky Mountain News

Courtesy Patrol Trooper Ron Gill helps James Vermillion with a radiator hose problem on Interstate 25.

State troopers paying courtesy calls

By Gary Massaro

Rocky Mountain News Staff Writer

Ron Gill proudly displayed the newest addition to his Colorado State Patrol uniform — a smile.

Gill was one of the first troopers to patrol interstates 25 and 70 as part of the new Mile High Courtesy Patrol — a team whose job is to aid stranded motorists during Denver's rush hours.

Gill was on the job Monday at 6 a.m., maneuvering a Chevrolet Suburban through the rush hour traffic, checking lanes and shoulders for stalled cars.

He found one just north of the Boulder Turnpike exit. David Taylor of Aurora had just started his van when a puff of black smoke billowed from the exhaust. The engine sputtered and died.

Gill offered assistance, but was told

it wasn't needed. "Someone put in diesel fuel by accident," Taylor said.

"I'm glad they're around," the driver said of the new patrol.

About a dozen troopers have agreed to work from 6 to 9 a.m. and from 3:30 to 6:30 p.m., in addition to their regular shifts, for the next six months. The troopers patrol from County Line Road to 84th Avenue on I-25 and Federal Boulevard to Washington Street on I-70.

"It's an experiment," said Colorado State Patrol Lt. Col. Lonnie Westphal.

Actually, the program and the name aren't new. Longtime Colorado residents will remember that the Colorado State Patrol was first called the Courtesy Patrol when it was formed in 1935.

It stayed that way until the early '60s, when it became part of the Colo-

rado Department of Highways.

"That's when they started saying all we do is write tickets for speeders," Westphal said. "Our motto is still 'Courteous but firm.' And we'll be a little more courteous in the Denver-metro area in the mornings and evenings."

Gill stopped behind four motorists during morning rush hour Monday. "One guy had a flat tire," Gill said. "He had everything he needed to fix it. Sometimes, I may help five people. Other times, it may be 20."

Courtesy Patrol drivers can give a gallon of gas or radiator fluid to stranded motorists, or even a push to get them out of the way.

"If the feedback is good and it seems to be helping traffic flow, we'll see about making it full time," Westphal said.

TRAFFIC BEAT

Group seeks reduction in traffic woes



Leroy Williams

A group finding ways to clear the area's freeways of traffic jams caused by crashes, spills and stalled vehicles will meet Wednesday to discuss 25 methods of reducing congestion.

The Colorado Incident Management Coalition was formed in September 1991. Its members have been studying potential solutions to the perennial problem of traffic backups — such as the sinkhole that yawned on northbound Interstate 25 early Monday near the Denver-Adams County border.

Tomorrow they will recommend establishing a traffic operations center for metro Denver that could possibly be expanded to the Front Range, said John Kiljan, a Colorado Department of Transportation engineer.

Think of a center as a place where people sit in a room and watch the area's highways on closed-circuit TV monitors.

"It would be a collecting point for traffic information through the city," Kiljan said. The center would collect data on incident locations, traffic volumes, weather and best detour routes and pass them on to law enforcement agencies or emergency service personnel.

The coalition — composed of 200 police, fire, municipal and state officials — also will hear other recommendations from its committees during a 9 a.m. meeting at Denver Marriott City Center downtown. Among them:

- Forming a cellular phone network to help drivers communicate with one another and with the proper authorities.

- Establishing a freeway courtesy patrol to assist stranded drivers in getting their stalled vehicles off the road. (The Mile High Courtesy Patrol, a six-month pilot project in which state troopers assist disabled motorists on I-25 and Interstate 70 during rush hours, began Aug. 31.)

Still to be determined however, is how the measures, if any, will be implemented and who pays.

The year-long effort has grown out of a recognition by officials that they must find ways to respond to incidents that cause traffic backups, which cost drivers money and time.

Also, diminishing dollars and lack of available land make highway expansion impractical, making it necessary, officials say, to better manage traffic on existing highways.

Leroy Williams covers transportation issues for the Rocky Mountain News. His traffic column appears Tuesdays

Rocky Mtn News
9-30-92

A ride to the rescue bogs down in mudhole

Courtesy Patrol gets stuck

By Tustin Amole

Rocky Mountain News Staff Writer

The road to good intentions is sometimes paved with mud. State Patrol Trooper Chris Skeers

“Fortunately, there was no damage to the vehicle — just my pride.”

Chris Skeers
State Patrol trooper

learned Tuesday.

Skeers was working on the newly formed Mile High Courtesy Patrol on Interstate 25 near Eighth Avenue when he spotted a stranded motorist. He deftly maneuvered his four-wheel-drive Chevrolet Suburban down the embankment and into a mud bog covered by grass.

“When I got in there, I was instantly stuck,” Skeers said. “It wouldn’t move.”

Skeers watched while the motorist got a ride. He radioed for help, then waited for the cavalry to rescue the cavalry.

“I sat there for a very embarrassing 10 to 15 minutes,” he said. “Fortunately, there was no damage to the vehicle — just my pride.”

Skeers, who usually provides security for Gov. Roy Romer, is one of several troopers to patrol interstates 25 and 70 in the new Mile High Courtesy Patrol — whose job is to aid stranded motorists during rush hours.

About a dozen troopers have agreed to work from 6 to 9 a.m. and from 3:30 to 6:30 p.m. for six months. The troopers patrol from County Line Road to 84th Avenue on I-25 and Federal Boulevard to Washington Street on I-70.

The idea, said Skeers, is to keep traffic flowing when motorists break down or, say, get stuck.

Patrol aids 1,100

The Mile Hi Courtesy Patrol rush-hour rescue squad has been in existence just two months, but it has helped more than 1,100 motorists. Of the drivers who have been helped on Interstates 25 and 70, about 400 have sent in reply cards. "This program is like having guardian angels patrol the road," one wrote. The patrol looks for stranded motorists and helps to get the cars off the road, ease traffic tieups and help prevent pollution.

Rocky Mountain News Staff

11/14/92

Rush-hour rescue squad gets raves

By Mary George

Denver Post Environment Writer

The Mile Hi Courtesy Patrol, a rush-hour rescue squad dubbed "the guardian angels" by one stranded motorist, has been declared a success after just two months.

Since the courtesy patrol began cruising Interstates 25 and 70 in the metro area on Aug. 31, they've helped more than 1,100 motorists. Their first priority: get the wreck off the road, ease the traffic jam and prevent air pollution. They help fix flats, supply gasoline or call a tow for more serious problems.

Of those helped, about 400 have sent in reply cards. The feedback has been a public-relations dream.

"This program is like having guardian angels patrol the road," one wrote.

"I was never so grateful to see anyone as I was to see your truck," penned another.

Some suggested expanding the patrol, and others approved of tax dollars supporting the six-month trial, which is costing \$120,000.

One driver wrote, "Peace of mind for my family and myself is worth a lot. So tax me!"

"We think that if we don't continue it, we're going to get a lot of complaints," said Bill Vidal, Denver area district engineer. Plans are being laid to continue the patrol.

Radio and TV traffic reporters who view rush-hour snarls from the air also report that stalls are being cleared in 5 minutes now rather than 15 or 30.