

Guidelines for Utilization of Police Officers in Traffic Control and Enforcement on Urban Freeways

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Presented in this paper are general guidelines for the use of uniformed police officers in highway maintenance, construction, and other traffic management activities, such as incident management and the operation of high occupancy vehicle facilities. The guidelines distinguish between traffic control and enforcement roles for uniformed police officers. The traffic control and enforcement guidelines are discussed in terms of: (a) objectives of using uniformed police officers; (b) requirements for implementing the guidelines; and (c) measuring the effectiveness of guideline use. Examples of possible applications of the guidelines are given for illustrative purposes. Because of the large number of variables, site characteristics, and transportation agencies involved, the guidelines presented in this paper are necessarily broad and general in nature. However, the paper outlines some recommendations regarding procedures for reviewing and refining the guidelines for possible adoption, dissemination, and implementation by those agencies responsible for enforcement and traffic control activities on freeway systems.

The construction, maintenance, and operation of transportation facilities are vitally dependent upon effective utilization of police personnel for safe and efficient control of traffic and enforcement of traffic regulations. However, traffic law enforcement and safety are only a part, albeit an important part, of an urban enforcement agency's responsibilities.

Although many states have police agencies highly competent in traffic control, the trend for law enforcement administrators has been to separate themselves from this activity because it is not traditional police work. Likewise, there has been considerable reluctance on the part of engineers to accept and involve enforcement agencies in the processes of planning and implementing transportation systems. Two factors have brought about the need for increased cooperation between these two groups.

First, legislation at both the federal and state levels has induced unprecedented levels of construction, reconstruction, and maintenance of the highway network. The work zones associated with construction and maintenance activities are susceptible to becoming locations of high accident frequency and/or sources of considerable traffic delay. The effective use of police officers in these areas should enhance safety and expedite traffic movement.

Second, growth in traffic demands has exceeded the development of the transportation infrastructure in many areas.

Innovative techniques in traffic system management (TSM) have been introduced to move more people faster on existing systems. Examples include priority facilities for high occupancy vehicles (HOV), ramp meter control, commercial vehicle routing, special speed zones and lane restrictions, and shoulder usage. Many of these techniques require a significant level of regulation compliance. Active enforcement by police personnel to insure acceptable compliance to these special regulations is essential for sustained and successful operation.

To safely and efficiently accommodate traffic movement on urban freeways in future years, an increasing presence and/or enforcement by police agencies will be required. The necessity for cooperation and mutual advisement between agencies responsible for transportation and law enforcement to effect this is obvious. The intent of this paper is to document guidelines for the utilization of police officers to optimize traffic control and enforcement under atypical roadway situations (work zones, incidents, etc.) or special transportation management strategies (HOV, ramp control, restrictions).

OBJECTIVES

The purposes of this paper are to (a) acquaint law enforcement agencies and officers with some of the unique characteristics of work zones and TSM projects and to attempt to define the role of law enforcement in traffic management; (b) provide guidelines to both transportation and law enforcement officials concerning the numbers and placement of personnel for traffic management and control in various work zone configurations; (c) provide guidelines concerning the levels of enforcement and the techniques necessary for obtaining motorist compliance with TSM regulations; and (d) provide transportation and law enforcement officials with information concerning implementation procedures and issues.

The guidelines presented in this paper have been categorized as traffic control or enforcement. *Traffic control* guidelines relate to those situations occurring on urban freeways in which a uniformed officer is needed to reinforce an existing traffic control plan for optimum vehicular movement. The officer functions as an authority figure with the capability of citation; however, for the purposes of traffic control, only the threat of citation is necessary.

The second category of guidelines, *enforcement*, refers to those transportation facilities or techniques which require unique or special restrictions to operate successfully. Com-

pliance with these restrictions is dependent upon the level and effectiveness of active enforcement.

The guidelines and other information presented are based on an extensive literature review (1), field observations, and interviews conducted with numerous enforcement officers and traffic engineers.

TRAFFIC CONTROL GUIDELINES

Maintenance and Construction Work Zones

The requirements for traffic control in maintenance and construction zones will vary from site to site. Choice of the appropriate technique and manpower requirements will depend on the type of work being performed, the length and duration of the work, and the time of day during which the work is being conducted. Each situation on urban freeways with the potential to utilize police officers for traffic control or enforcement must be considered independently. In all cases, the *Manual on Uniform Traffic Control Devices* (MUTCD) (2) should be adhered to for work zone traffic control devices, and police officer traffic control should be implemented in concert with these standards.

Table 1 summarizes the goals, objectives, and measures of effectiveness for traffic control strategies which may be used in conjunction with maintenance and construction activities.

Urban freeway traffic can be managed adequately through many construction and maintenance projects by following an effective traffic control plan utilizing competent flagmen. However, under conditions of high traffic demand, stressful

geometrics, unprotected and/or unusual work activity, or nighttime operations, the support and authority conveyed by a uniformed police officer at the work site facilitates safe and efficient traffic control. Specifically, officers may be most effective in speed control.

Figure 1 shows an example of minimal utilization of police officer support for traffic control in work zones. The project site is adjacent to freeway mainlanes. No transition, constriction, or blockage of the freeway lanes is required. An active flagman located off the roadway prior to the work zone should provide adequate warning, protection, and control of any potential traffic encroachment. But, if any of the mitigating factors cited previously exist at the site causing a degradation in safety or operations, the utilization of a uniformed police officer is recommended either in place of or in conjunction with the flagman.

For construction or maintenance work sites that physically close one freeway lane, as shown in Figure 2, a flagman or police officer should be positioned just before the delineated point of transition. The transition may be from multiple full-width lanes to an equal number of narrow lanes or from multiple lanes to a single lane. In either case, the flagman or officer should reinforce the advisements of other traffic control devices and physically provide demarcation of the point necessary for driving adjustment. The decision to use a police officer for traffic control authority at this location should reside with the project engineer, with the concurrence of the police agency under jurisdiction.

Additional flagmen and police support may also be necessary in advance of the transition for speed control and/or immediately adjacent to the exposed site if no other physical

TABLE 1 GOALS, OBJECTIVES, AND MEASURES OF EFFECTIVENESS FOR URBAN FREEWAY MAINTENANCE AND CONSTRUCTION TRAFFIC CONTROL STRATEGIES UTILIZING POLICE OFFICERS

Urban Freeway Goal	Traffic Control Objectives	Enforcement Strategies	Measures of Effectiveness
<p>Insure safety of the work zone</p>	<ul style="list-style-type: none"> ● Maximize safety 	<ul style="list-style-type: none"> ● Maximize visibility of site and personnel ● Provide advance position of personnel and warning of work zone to insure prior speed reduction ● Position personnel and traffic control devices immediately adjacent to conflict points 	<ul style="list-style-type: none"> ● Accidents (personal injury and property damage) ● Accidents rates ● Conflicts
<p>Maintain acceptable traffic flows through the work zone</p>	<ul style="list-style-type: none"> ● Minimize motorist delays 	<ul style="list-style-type: none"> ● Active traffic control by police personnel in cooperation with the supervising project engineer 	<ul style="list-style-type: none"> ● Travel times ● Speeds ● Length of queues ● Flow rates

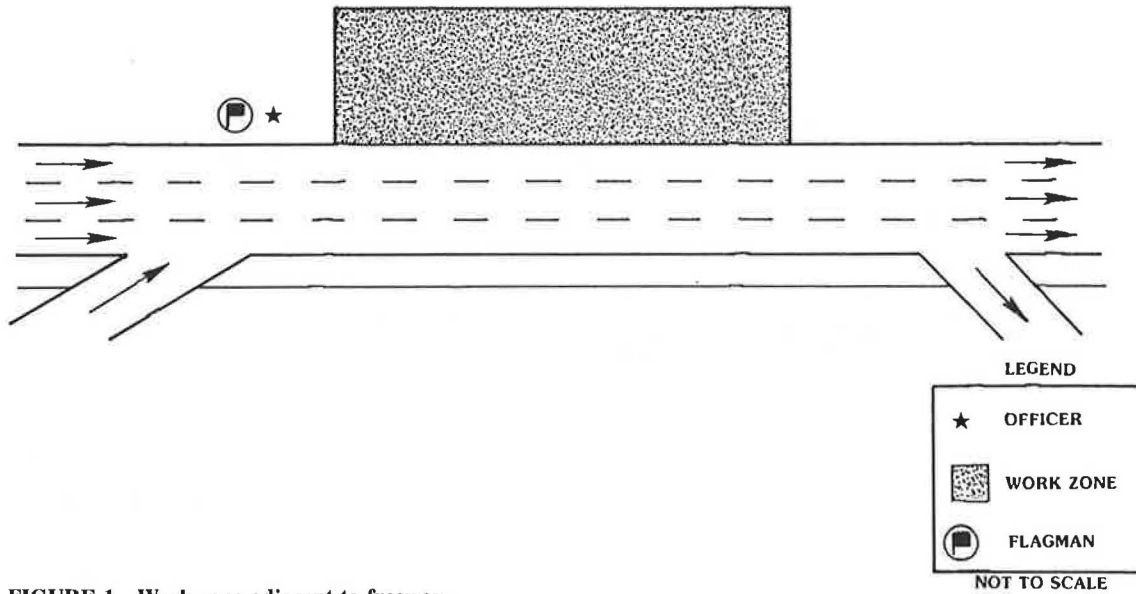


FIGURE 1 Work zone adjacent to freeway.

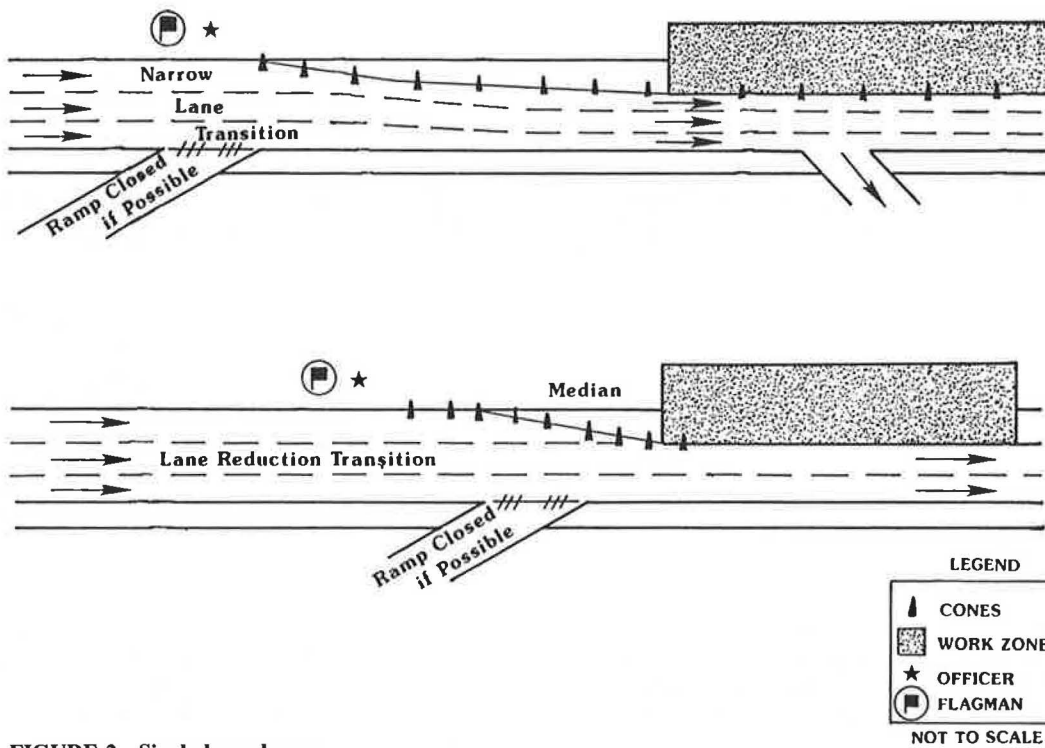


FIGURE 2 Single lane closure.

protection is provided to equipment and work personnel. This decision should be at the discretion of the project engineer based on safety and operational considerations and in concert with local enforcement officer advisement.

For those locations where construction or maintenance activities reduce the capacity of heavily congested freeways or where work must be conducted during peak commuter periods, excessive queueing and delay may result. As illustrated in Figure 3, one option to minimize delay may be to divert a portion of the mainlane traffic to parallel frontage

roads. This is only possible if the work site is contained within the limits of an exit-entrance ramp pair. Officers should be at locations indicated to intercept, expedite movement, and reroute onto the freeway beyond the work zone. Each site should be considered unique as to utilization of police support in this regard.

Figure 4 provides two examples of more extensive and major work sites necessitating the closure of two or more lanes on a multilane freeway facility. A flagman or police officer should be located before the first point of physical transition. Addi-

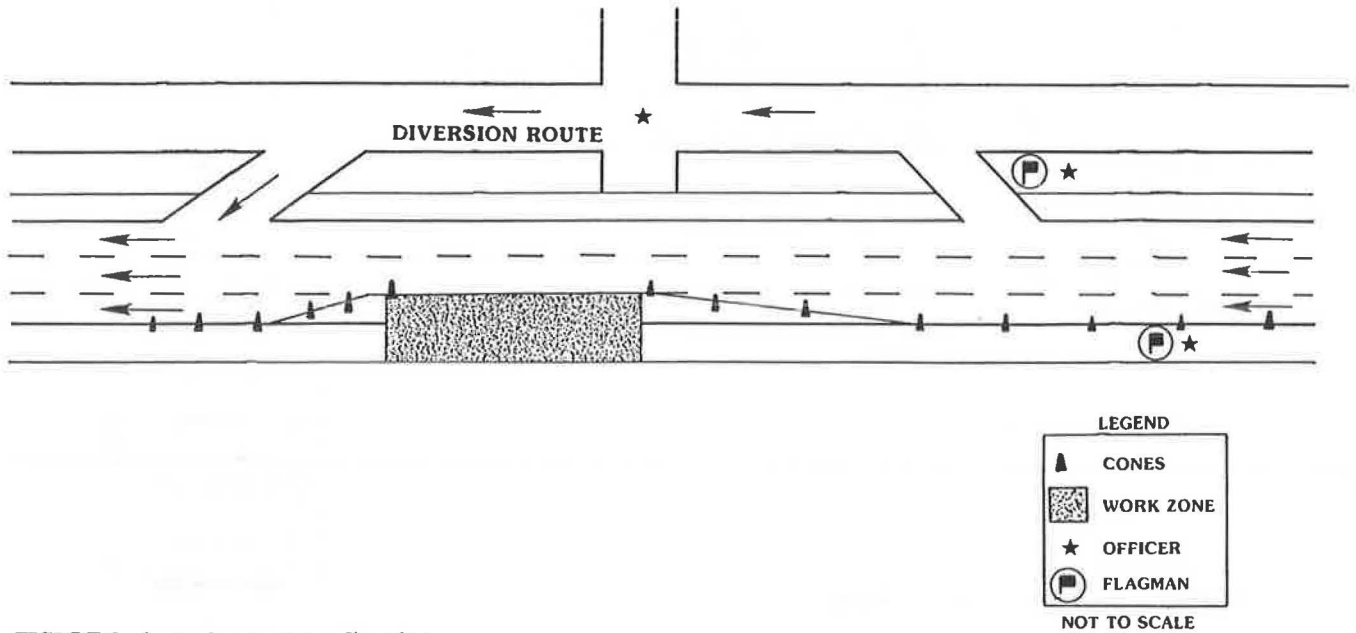


FIGURE 3 Lane closure queue diversion.

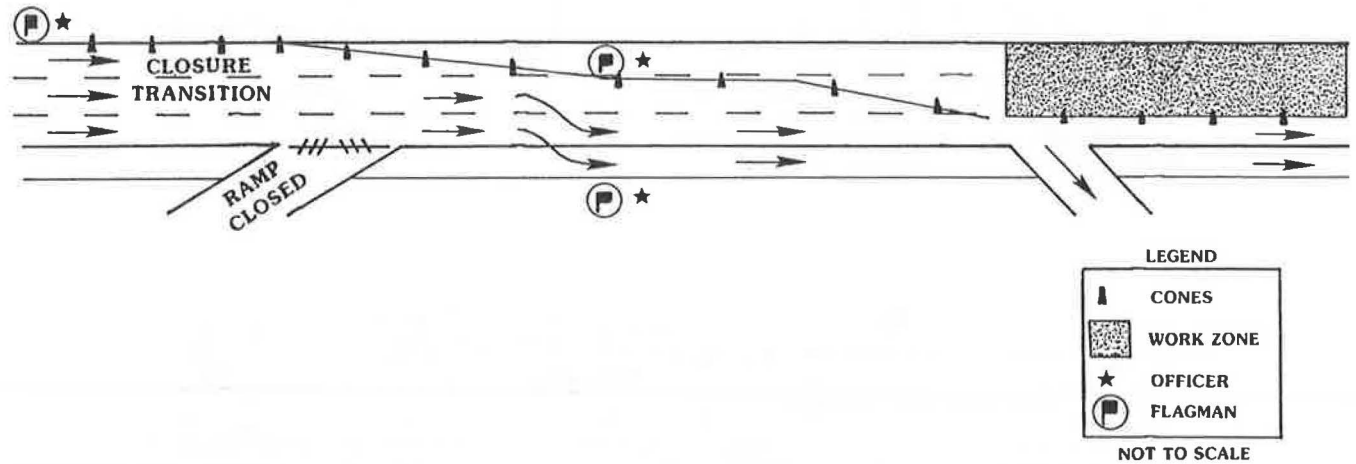


FIGURE 4 Lane closures with diversion.

tional flagmen or officers may be required in advance of the transition itself to reinforce the signing advisements and to positively effect the desired merge maneuvers. Other flagmen or officers may need to be positioned at the secondary transition or adjacent to the work site itself. All of these possible locations using police officer support for traffic control are shown in Figure 4.

The decision to use police support at any or all of these positions to optimize traffic flow and safety within the work zone should be made by the project engineer in consultation with the local police commander. Where several officers are used for a long period of time, provisions should be made for breaks and specified officers should be designated as supervisors.

Maximum use of uniformed police officer support occurs under conditions of a complete freeway closure due to major construction or maintenance operations. Freeway traffic would

be intercepted at some point before the work site, transitioned off the freeway, diverted along a parallel route around the project area, and directed back onto the freeway. Obviously, extensive signing and delineation would be employed for warning, advisement, and routing. Flagmen or uniformed police officers, or both, would be used to reinforce traffic communication in advance of the closure. Flagmen or officers, or both, positioned at all transition points would enhance timely and appropriate traffic maneuvers for diversion. Police personnel would also be desirable for authority support at all locations (intersections) requiring manual traffic control.

Figure 5 shows two possible scenarios of freeway closure and locations of police officers for traffic control support. One scenario involves work activity closing the freeway between exit/entrance ramp pairs such that the ramps serve as the diversion route links to and from the frontage road. The second scenario involves diverting traffic off the freeway by an

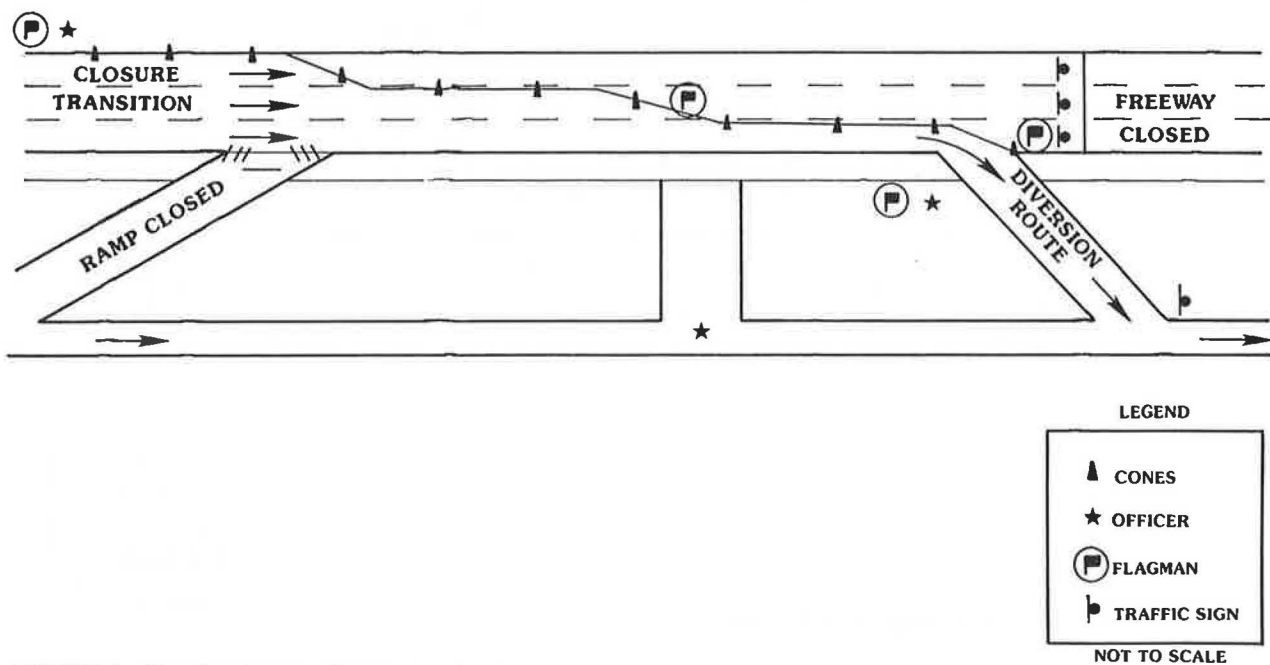


FIGURE 5 Complete freeway closure and diversion.

TABLE 2 GOALS, OBJECTIVES, AND MEASURES OF EFFECTIVENESS FOR MAJOR FREEWAY INCIDENT TRAFFIC CONTROL STRATEGIES UTILIZING POLICE OFFICERS

Goal	Objectives	Strategies	Measures of Effectiveness
Protect the incident site	<ul style="list-style-type: none"> ● Minimize secondary incidents ● Insure emergency vehicle access 	<ul style="list-style-type: none"> ● Maximize visibility of incident site ● Provide advance warning 	<ul style="list-style-type: none"> ● Accidents ● Accident rates ● Emergency vehicle response time
Maintain traffic flow and clear incident	<ul style="list-style-type: none"> ● Minimize motorist delay ● Maximize safety 	<ul style="list-style-type: none"> ● Use of shoulders ● Manually-controlled merging ● Contraflow diversion ● Advance warning signs ● Off-freeway diversion ● Pre-planning (types and location of equipment and personnel) 	<ul style="list-style-type: none"> ● Travel times ● Speeds ● Accident rates ● Emergency vehicle response time ● Time required to return to normal operations

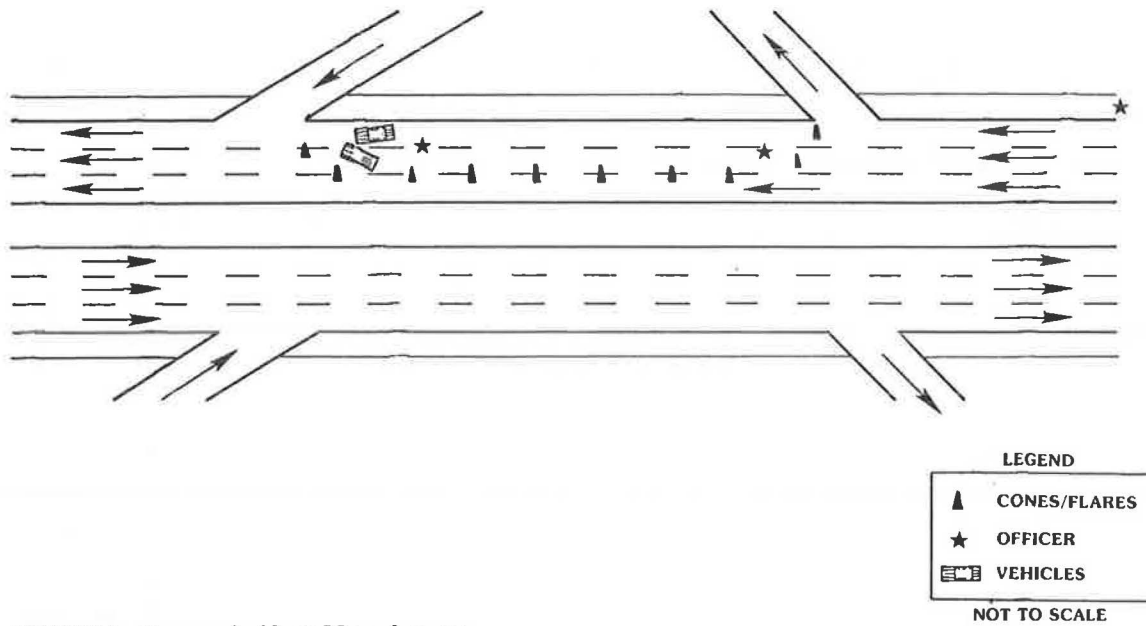


FIGURE 6 Freeway incident: Manual merge.

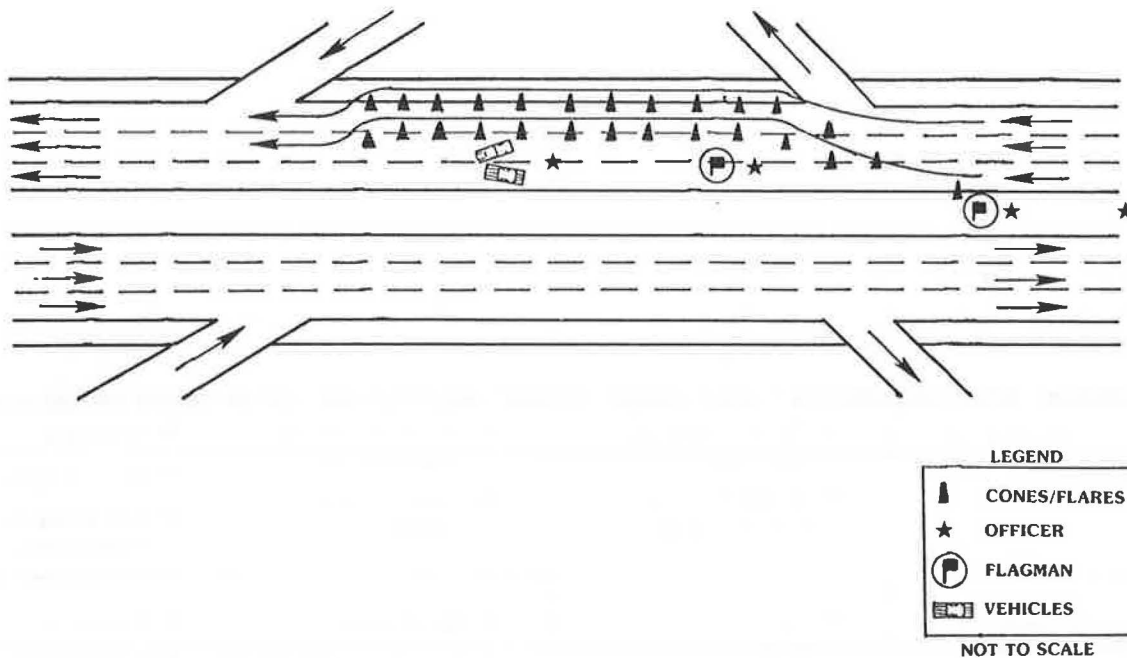


FIGURE 7 Freeway incident: Shoulder usage.

exit ramp and onto a nearby parallel arterial. Either scenario involves several officers and additional support as indicated for traffic control. These same scenarios for complete diversion and example applications of police utilization could follow from a major incident (accident, breakdown, emergency, weather, etc.) closing the freeway.

It should be noted that Figures 1 to 5 are simple illustrations to provide reference positions of flagmen/officers relative to a type and location of construction and maintenance work area. Signing and delineation details of the traffic control plan associated with a particular work site are not included. In all cases, the MUTCD for work zone traffic control devices should

be adhered to and police officer traffic control implemented in concert with these standards.

Major Incident Response

A major incident is defined as one that cannot be effectively managed by a single patrolman or patrol vehicle. General guidelines for two incident management strategies (techniques for increasing capacity and techniques for managing demand) are presented. Techniques for increasing capacity in the vicinity of an incident include use of freeway shoulders, merging

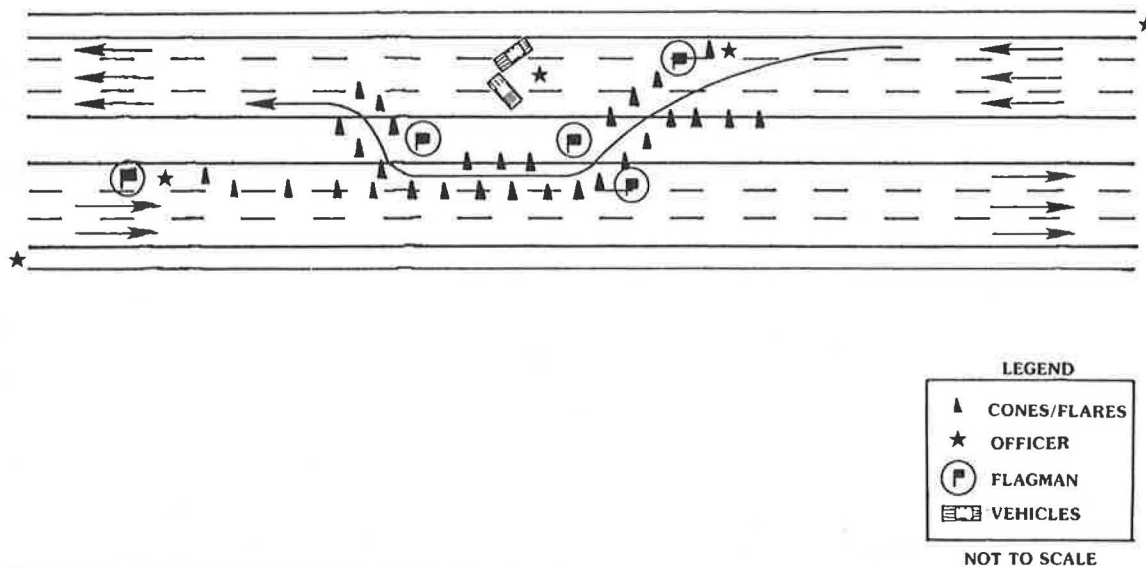


FIGURE 8 Major freeway incident: Contraflow diversion.

techniques, and contraflow operations. Demand management strategies include off-freeway division and advance warning signs.

Because the primary objective of incident management is to restore freeway traffic services as quickly and as safely as possible, the effectiveness of incident management techniques using police officers should be measured in terms of how quickly the incident can be cleared and normal traffic services restored, and how effective the techniques are in preventing or minimizing secondary incidents. The data in Table 2 summarize freeway incident management traffic control strategies in terms of goals, objectives, and measures of effectiveness.

Figures 6 to 8 show typical applications of freeway incident management techniques utilizing police officers. Figure 6 shows an incident requiring patrolmen to effect a manual merging of traffic into the remaining open freeway lane. One patrolman should always be positioned to protect the incident site while other officers are responsible for traffic control associated with the merge transition (or division), if necessary. Transportation agency personnel, as available, should provide assistance with traffic control device placement, flagging support, and other traffic management support. Flagging support should be of a traffic-direction approach carried out by specially trained personnel.

Figures 7 and 8 provide two examples of freeway incident management to make maximum use of available lane capacity. Figure 7 presents a freeway incident blocking the inside lanes. Police officers are used to transition traffic into the remaining open lane and along the shoulder for an additional lane. Figure 8 indicates a major incident closing the freeway. Patrolmen or flagging support, or both, are located to transition traffic to take advantage of capacity in the opposite direction. Obviously, this scenario would only be possible where there was no physical median obstruction.

In either case of shoulder use (Figure 7) or contraflow diversion (Figure 8), extensive delineation and flagging support is needed in addition to uniformed officers. The exact requirements for both police and other support depend on the duration of blockage, the location of the incident, and the time of day (peak, off-peak).

ENFORCEMENT GUIDELINES

Priority Treatment Facilities

The objectives of police enforcement on priority treatment facilities (transitways, concurrent flow lanes, contraflow lanes, HOV bypass ramps) are to maintain the operational integrity and safety of the facilities. Consequently, a strict and active enforcement program is necessary. Detection and apprehension, issuance of citations, and effective prosecution of violators is essential (3).

For priority treatment facilities that do not have full access controls and/or are not physically separated from the general use freeway lanes, tandem enforcement at strategic locations along the facility may be applicable. In this technique, one officer detects violators and a second officer stationed downstream apprehends and cites violators. The data in Table 3 summarize the goals, objectives, and measures of effectiveness for priority treatment enforcement techniques.

Figures 9 to 11 show several examples of enforcement on priority treatment facilities. Figure 9 indicates officer locations on two types of priority entry ramps. The patrolman must be in a position for good visibility on the ramp to assess priority restrictions with sufficient time to restrain violators. It is critical to have a refuge area adjacent to the priority ramp for this purpose and to issue citations.

Figure 10 shows possible enforcement strategies for either contraflow or concurrent flow lanes. Detection and apprehension of priority violators may employ "catchment pairs" of patrolmen or routine line patrol procedures. Again, refuge areas for citation are essential.

Figure 11 shows the possible need for additional officers for enforcement on physically separated, controlled access, priority treatment facilities (transitways) with multiple entry/exit points. Violations must be controlled to maintain the priority authorization of the facility.

Enforcement on priority treatment facilities may come from local police agency personnel or it may be the responsibility of the operating transit authority. In this case, special transit police may enforce (detect, apprehend, cite) violations on

TABLE 3 GOALS, OBJECTIVES, AND MEASURES OF EFFECTIVENESS FOR PRIORITY TREATMENT ENFORCEMENT STRATEGIES

Goal	Objectives	Strategies	Measures of Effectiveness
Maintain operational integrity	<ul style="list-style-type: none"> ● Minimize travel times ● Maximize vehicle occupancy levels ● Minimize violation rates 	<ul style="list-style-type: none"> ● Strict enforcement of occupancy requirements ● Clear communication of nature of facility ● High visibility of enforcement officers ● Swift, safe removal of violators 	<ul style="list-style-type: none"> ● Violations ● Violation rates ● Travel times
Maintain safe operation	<ul style="list-style-type: none"> ● Minimize accidents ● Minimize incident response and clearance times 	<ul style="list-style-type: none"> ● Strict enforcement of authorization requirements ● Clear communications of nature of facility ● Swift, safe removal of violators 	<ul style="list-style-type: none"> ● Accidents ● Accident rates ● Incident response and clearance times

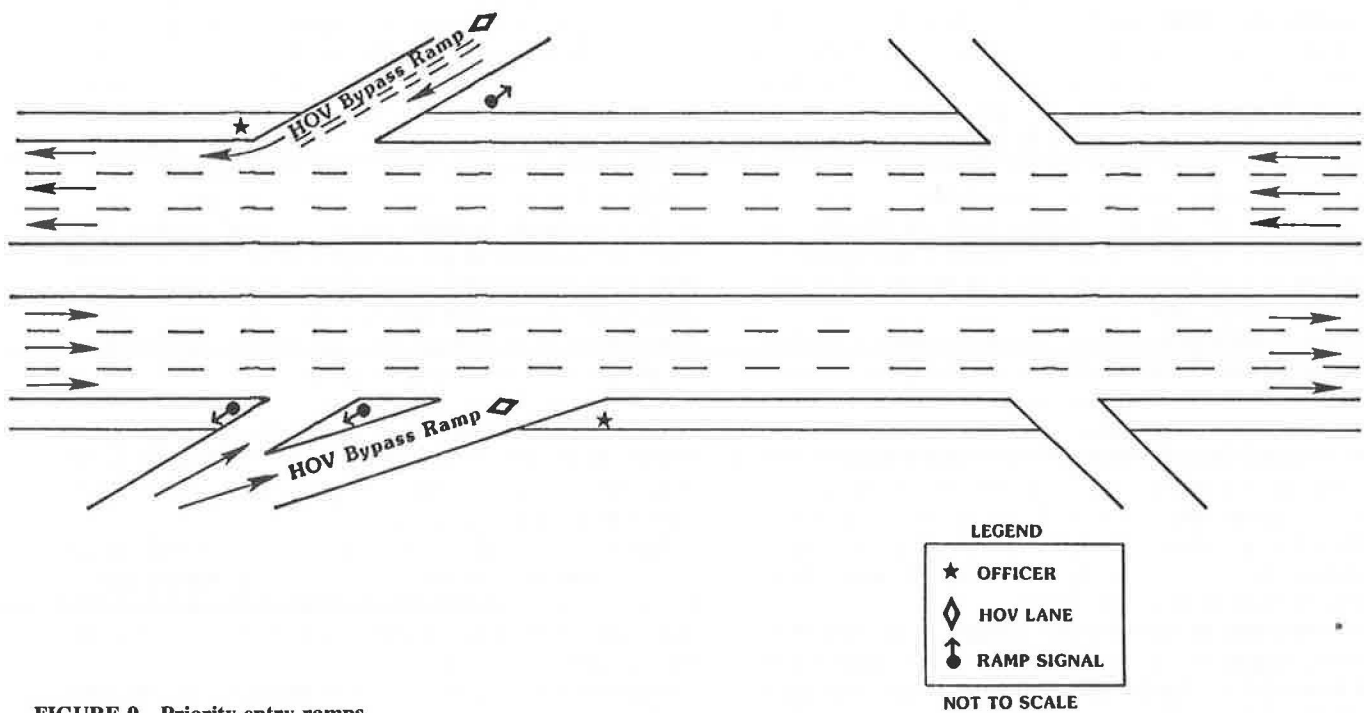


FIGURE 9 Priority entry ramps.

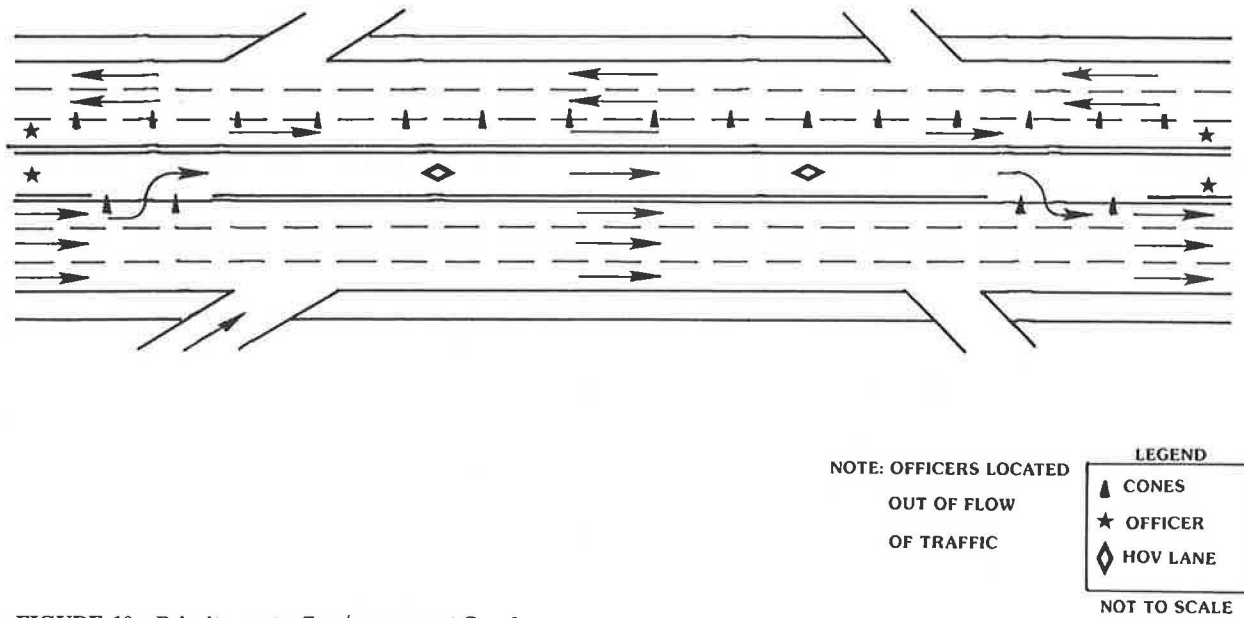


FIGURE 10 Priority contraflow/concurrent flow lanes.

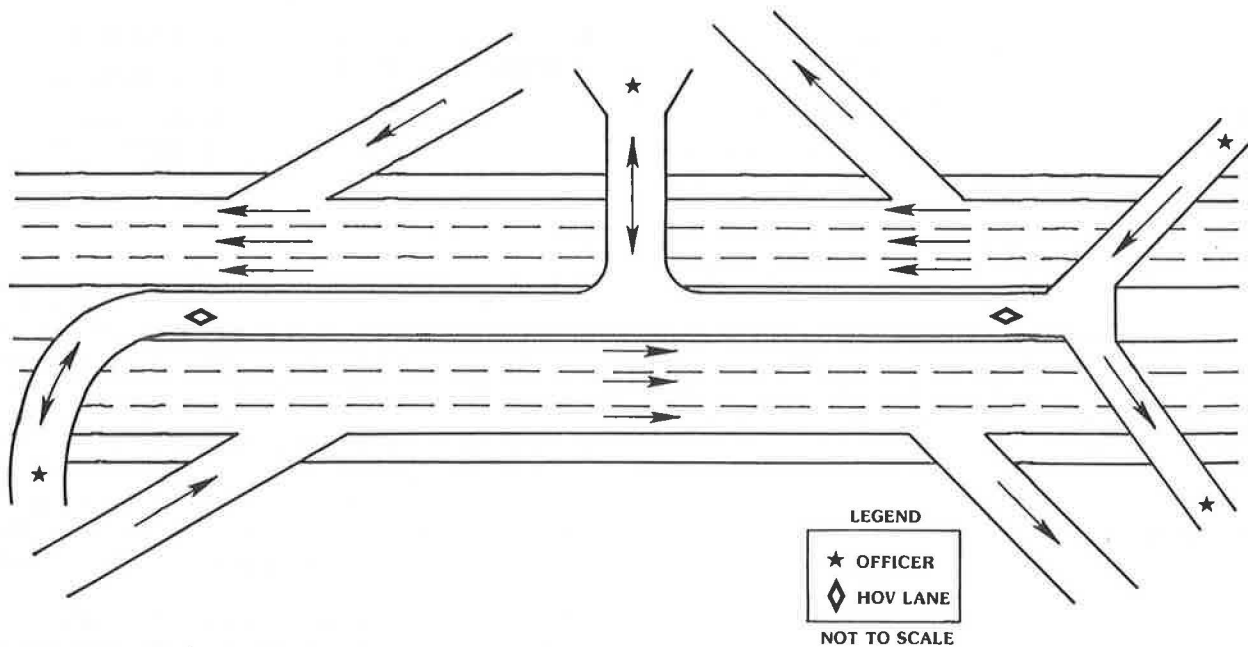


FIGURE 11 Median transitway.

these types of priority facilities. This somewhat insures consistency in enforcement due to more day-to-day facility operating experience by the transit police personnel.

Transportation System Management Operations

Transportation system management (TSM) strategies are actions or groups of actions intended to produce shifts in the supply-demand equilibrium of the transportation system. Many of these strategies involve a rearrangement of physical facilities and/or operating practices, requiring users to face new

situations and to learn new rules. Consequently, the success of many TSM strategies, such as ramp metering, commercial vehicle routing, speed zoning, lane restrictions, and shoulder usage, depends on the effectiveness of the enforcement program which accompanies them.

There are three basic enforcement strategies that may be used in conjunction with TSM projects: (a) routine enforcement; (b) special enforcement; and (c) selective enforcement. Specific enforcement procedures for TSM projects may include one or more of the following apprehension and citation procedures: (a) standard; (b) stationary; and/or (c) signaling. Line and stationary patrols with standard or stationary appre-

TABLE 4 GOALS, OBJECTIVES, AND MEASURES OF EFFECTIVENESS FOR SELECTED TSM PROJECT ENFORCEMENT STRATEGIES

System Goal	Transportation Management Objectives	Enforcement Strategies	Measures of Effectiveness
Manage system demand	<ul style="list-style-type: none"> ● Meter freeway input (ramp metering) ● Reduce commercial vehicle congestion (commercial vehicle routing) ● Segregate vehicle types (lane restrictions) ● Reduce incidents and conflicts (e.g., speed zoning) 	<ul style="list-style-type: none"> ● Strict enforcement of ramp metering ● Strict enforcement of truck/commercial vehicle route regulations ● Strict enforcement of lane restrictions ● Strict enforcement of speed limits ● High visibility of enforcement officers ● Institution of selective enforcement programs 	<ul style="list-style-type: none"> ● Violations ● Violation rates ● Travel times
Increase system capacity	<ul style="list-style-type: none"> ● Maximize capacity (shoulder usage) ● Minimize travel times 	<ul style="list-style-type: none"> ● Institution of selective enforcement programs 	<ul style="list-style-type: none"> ● Travel times ● Accident rates ● Flow rates

hension and citation methods are the most commonly used enforcement procedures associated with TSM improvement projects.

As with priority treatment facilities, the effectiveness of TSM enforcement activities may be evaluated in terms of compliance with posted restrictions and regulations. Table 4 summarizes the goals, objectives, and measures of effectiveness for selected TSM project enforcement strategies.

RECOMMENDATIONS

The guidelines presented provide a framework for assessing the need for using uniformed police personnel for a large range of activities. Although formulated from field observations and expert consultation, these guidelines require evaluation for further refinement. It is the intention of the guidelines to supplement the required traffic control devices and traffic control plans with skilled persons who can command the attention of the motorists and receive compliance with their directives to achieve acceptable levels of operations and safety.

For the guidelines to be effective, they must be able to be implemented. Many issues and problems must be resolved if wide-scale application of the guidelines is to be achieved. The issues can be categorized as: (a) institutional, or dealing with the internal and external orientation and relationships of law enforcement agencies; (b) legal; and (c) economic, or related to manpower and funding.

Institutional

Law enforcement personnel, by virtue of their training, are oriented toward apprehending people who violate laws. They are much more familiar with this aspect of their responsibility than they are with preventing violation or using their authority to control behavior. Because of this orientation, it is not surprising that some officers, when asked to control traffic through work zones, resort to citing violators. This form of institutional resistance is usually compounded by transportation personnel who are not sure of the role law enforcement officers are to play when they are assigned to work zones and to whom they are responsible.

This enforcement orientation is not as prevalent during the occurrence of major incidents because of the requirements to secure the scene from a safety standpoint and because these incidents are usually of short duration. However, the attention of responding officers is on resolving the incident rather than managing the traffic problems that develop. In some cases, the number of officers dispatched to the scene of a major incident is insufficient to handle both the incident management and traffic control roles. During these incidents, many agencies may respond, which may result in confusion over control authority and conflicts of purpose.

The basic institutional issues that should be addressed in assessing enforcement needs are those of enforcement philosophy and interagency cooperation. Most enforcement agencies consider traffic enforcement measures primarily as a means to reduce accidents or improve the safety of a specific

facility. This basic philosophy needs to be expanded to encompass the effective use of enforcement strategies in achieving an efficient traffic movement. Early involvement of the enforcement agency in project planning, or additional enforcement agency training programs, may be needed to broaden the enforcement philosophy.

Enforcement agencies tend to be institutionally isolated from those agencies responsible for transportation planning. Typically, police officials are not members of, and do not attend meetings of, formal transportation groups. Police involvement in transportation planning is usually on a project-by-project basis. A significant factor in achieving a successful enforcement program appears to be early involvement in the planning process by representatives of the enforcement agencies affected.

Legal

The primary legal issue that results from the use of law enforcement personnel to control traffic through work zones is the disparity between the job they are contracted to perform and their sworn duty to uphold the law. In order to effectively manage traffic, officers cannot divert attention to the time-consuming activity of stopping and citing violators. However, officers are obligated and trained to take action against drivers committing infractions. This dilemma is further compounded by the restriction against using funds dedicated for construction and maintenance to pay for enforcement activities. These funds, however, can be used to pay for traffic control. In this regard, the primary responsibility of the officer is to the specific task set by the contractor; other enforcement activities become secondary.

Legal issues that should be considered in assessing enforcement needs and procedures include not only the legality and enforceability of a particular strategy, but the responsibility for enforcement as well. In terms of the legality of the enforcement guidelines suggested in this study, the following specific legal issues should be researched with respect to state and local law.

- *HOV priority treatment facilities:* Lane restrictions for HOV facilities may be enforced by state, local, or special (e.g., transit authority) enforcement agencies. Local and/or state ordinances may need to be revised to clarify enforcement responsibilities for such facilities.

- *Work/construction zone speed restrictions:* Work and construction zones typically have lower speed limits than those sections of the roadway on either end of the zones. However, given the current practice of allowing a 5–10 mph leeway in enforcing speed restrictions, the potential effectiveness of these speed restrictions may be diminished. Legislative changes may be necessary to clarify procedures for establishing speed limits and to permit more stringent enforcement of speed limits in construction work zones. Paradoxically, enforcement personnel must balance the need to enforce speed limits with the need to maintain efficient traffic movement in such zones.

- *Use of innovative enforcement procedures:* Various alternatives to standard enforcement procedures have been suggested. A number of legal issues have been raised regarding the employment of some of this advanced technology, espe-

cially when it involves photography. Most of the concerns raised to date about the systems have been found not to present formidable legal barriers to their employment in the United States. The major exception is the liability problem, which arises with photographic systems when only the vehicle owner can be identified (through the license plate), and not the driver (5).

Economic

The main economic issue is that of allocation of scarce resources. Enforcement agencies are notoriously undermanned and are consequently reluctant to dedicate manpower to areas other than those of the highest priority. In most urban areas, crime prevention and criminal investigation take precedence over traffic law enforcement. Within the realm of traffic law enforcement, traffic control assumes a lower priority than active traffic law enforcement, and the probability of having manpower consistently available for traffic control is small. Consequently, there is a need for funds to hire off-duty personnel on a supplemental basis. Since active enforcement is not desired and since a clear-cut accident problem usually does not exist, selective traffic enforcement, or STEP, funds would not be appropriate. This suggests that funds set aside by contractors for traffic control may be the best source, provided the institutional and legal difficulties can be overcome.

Many police agencies no longer have a special division for traffic. Consequently, traffic enforcement and any other transportation-related activity must compete with the other responsibilities of a police agency. This means that either police enforcement for traffic management functions may not be available on a consistent basis or that alternative means of enforcement and/or funding may be needed.

In the case of scheduled enforcement activities (e.g., construction/maintenance and HOV facility enforcement) enforcement costs could be included as a line item in the project budget. For nonscheduled enforcement activities (e.g., incident management) additional funds will be needed if these activities are to be effectively managed. At this point, it is not clear what source(s) may be available to fund these enforcement activities.

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