

3.4 Traffic Controls and ITS

A wide variety of ITS applications can be considered for HOV/managed lanes. These relate to real time monitoring of day-to-day operation, enforcement, incident management, BRT and transit related applications for passenger information, system integration with general purpose lane needs and HOV/managed lane performance monitoring. Described in this section are design issues unique to the operation of HOV/managed lanes, including pricing, access control, and incident management and communication.

Incident Management

A strategy that responds to minor incidents, crashes and other non-recurring events that disrupt traffic, whether they be freeway- or HOV-related, is called *incident management*. The goal of incident management on HOV/managed lanes is similar to all freeway lanes-- to react and clear incidents and other capacity-restricting events in a minimum amount of time to maintain overall roadway reliability. Four elements involved in incident management include:

- Detecting the incident
- Responding to the incident
- Clearing the incident, and
- Communicating this information to other motorists.

Detection

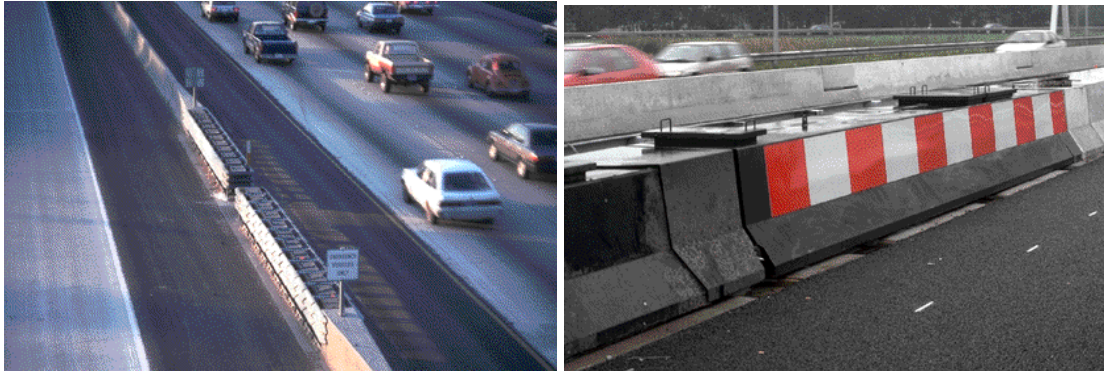
Verifying the type, nature, and location of an incident involves detection, which can come from witnesses calling in on cell phones, radio dispatches from police, television monitoring, or roadside or pavement detectors monitoring traffic flow. Still, these tools may not be sufficient to provide an effective and reliable means of knowing where the incident is, how significant it is, and what response will be required. Newer technologies are continuing to emerge, like GPS-based communication, and may further enhance detection capability.

Response

Responding to an incident involves various methods to resolve a disruption. Traditional means of removing disabled vehicles generally work for non-separated or buffer-separated concurrent flow lanes, but may not work for reversible or barrier separated lanes because of the restricted access roadway setting. A typical response involves the deployment of a tow truck to remove the disabled vehicle. This response may require special agreements with local tow truck companies, or with local or state agency towing operators. Whenever a major incident disrupts all freeway and HOV lanes and barriers do not preclude traffic from using all lanes, emergency and traffic management personnel may allow all traffic into an HOV lane for the affected period to help clear the scene. Announcement of this temporary access can occur via radio and changeable message signs, and such policy exists for HOV lanes in other regions.

Responsiveness is enhanced for barrier-separated lanes if openings in the barrier or barrier opening gates are included at periodic intervals of one to two miles, depending on frequency of other direct access features. Examples of both are illustrated in Figure 3-41.

Figure 3-41: Examples of Emergency Barrier Openings



Clearing

Clearing an incident involves the removal of the impediments, usually the disabled or damaged vehicles, using the same methods on HOV lanes as are used on freeways in general. The inclusion of a breakdown shoulder adjacent to the HOV lane can be helpful in providing refuge for a disabled vehicle and a means for emergency personnel to quickly access the scene of an accident and clear it more quickly. Barrier-separation can help keep incidents in one facility from affecting the parallel roadway, but may inhibit emergency vehicle and wrecker access without the presence of emergency barrier openings. Lane treatments with less than 20-foot overall widths between barriers may be particularly vulnerable to incidents that are difficult to clear, because the width will severely limit how fast wreckers can clear the incident.

Communication

Conveying real-time information to HOV/managed lane users involves many communication channels, best facilitated from a single command center. Communication to lane users is best provided in advance of ingress locations, so that if the facility needs to be closed, users can choose other routes before becoming committed. On reversible-flow HOV facilities, communication needed to verify the direction of operation can also double as a means of providing incident management communication.

The above common steps may have different applications for each type of facility. For example, a much more intensive monitoring function is needed for a reversible or contraflow lane where wrong way movements need to be quickly detected and preferably intervened to avoid potential crashes. Similarly, a roadway design that does not contain a full emergency breakdown shoulder will experience a higher rate of failure where minor incidents can disrupt flow than a full design, and it will need more attention to monitoring and incident response countermeasures. While barriers separating the HOV/managed lane from other lanes may promote safer operation, the ease of addressing incidents may

be made more difficult. Without barriers any major incident may disrupt all traffic—HOV and general purpose--in a given direction. Specific strategies applied to each project setting are unique and often adjusted based on experience. In every case, more aggressive monitoring and response to incidents is justified, and users will typically respond if the level of reliability is inadequate. Many of the more constrained and highly utilized projects employ on-site personnel and services that can provide a high degree of responsiveness to any events (operational or maintenance related) that can disrupt or compromise the intended operational integrity of the HOV or managed lane facility. Where possible, these functions are monitored remotely and coordinated with field personnel. Signing may target specific information to HOV lane users (Figure 3-42).

Figure 3-42: Communication to of Real-time Information to HOV Lane Users



Incident Management and Communication

The functional requirements for managed roadways are best integrated into a region's traffic operation center. In many cases, on-site personnel are also employed to monitor and address traffic incidents and enforce rules and regulations that cannot be addressed remotely. Reversible flow lanes, in particular, must have on-site staffing to ensure safe and efficient opening and closure of lane operation, regardless of the level of automation applied to the deployment of traffic control devices. Typically, staffing varies of the degree of automation, but a minimum of one person per peak period needs to drive the lane and make sure all of the traffic control devices are fully deployed in a correct manner.

Managed lanes are increasingly turning to ITS systems to track users, monitor operation performance, confirm whether tolls have been paid, and confirm lane status when incidents occur. Website posting of separate real-time travel speeds and service reliability for the HOV lanes in some cities such as Seattle, Houston and Orange County, California, are already occurring, enabling users to quickly assess available travel benefits between the parallel roadways. Functional requirements for the freeway and HOV/managed lane system should be reviewed periodically as design upgrades in technology and traffic operations management allow.