

Alternate Route Planning: Successful Incident Traffic Management

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A congestion-causing freeway incident causes the capacity-demand relation to go out of balance. The solutions to such incidents are to restore the temporarily reduced capacity as soon as possible and to limit demand at the incident by diverting traffic. This paper discusses the alternate route planning procedure being developed in southern California. As part of the preplanning effort, information on all segments of the freeways was gathered and mapped. The main elements of the maps are discussed, and a sample map is presented. The two concepts used in implementing alternate route planning are the on-site command post and the incident response team. These are discussed as they relate to incident management.

A commuter is traveling along the freeway on his way to work. About halfway to his destination, traffic comes almost to a complete stop in heavy congestion. At that moment the radio relates the sad story of an overturned truck miles ahead on the freeway. Then comes the simple statement, "Take an alternate route." He drives the freeway twice a day but has no knowledge of the surface streets in the area. Where is an alternate route? Where can he get on it? Where can he get back on the freeway? Will he really save time by using the alternate route? With all these questions to answer, all too often the motorist stays on the freeway and frets his way through the problem area.

Table 1 gives data on the magnitude of nonrecurrent capacity-reducing incidents on the more than 650-mile Los Angeles freeway network. It is estimated that 10 percent of the incidents are major and account for 30 percent of the delay due to incidents.

PREPLANNING

Alternate route planning, being developed in southern California, holds the answer to many of the motorist's questions. When a congestion-causing incident occurs, the capacity-demand relationship is thrown out of balance because of a temporary reduction in capacity. Restoration of full capacity as rapidly as possible is essential; in the meantime, limiting demand at the incident, rerouting the remaining capacity to alternate routes around the incident, and providing advance information of the incident can do much to alleviate the problem. In other words, incident management can yield substantial benefits. And preplanning of alternate routes is the necessary foundation on which to build effective incident management.

In California, the responsibility for management of incidents such as overturned trucks on freeways rests with the California Highway Patrol. In Los Angeles we and the Los Angeles police and traffic department have for some time been working with the California Highway Patrol in an extensive program of planning and implementation of alternate routes.

As a first step in the planning phase, we inventoried all existing surface streets that might serve as alternate routes for every section of freeway in the Los Angeles area. Street widths, curvature, grades, condition of surfacing, intersections, side friction, and turning radii were all recorded. At the same time, we identified missing links that might be constructed to close gaps in desirable alternate routes. We could then select best alternate routes for each possible freeway closure.

In planning, we took the position that we would use whatever capacity remained on the freeway (measured by the number of lanes remaining open) to the maximum extent possible. Physical data collected during the inventory were converted and expressed in terms of capacity. These were incrementally added to remaining freeway capacity (if any) to develop the total capacity needed by implementing the alternate route in varying stages.

In analysis of demand, it is impractical to check demand at each incident before alternate routing is implemented. We gathered demand information for each freeway by time of day. By breaking the day into various segments, we could assign a demand value to each time slice.

We then had the necessary values to analyze the capacity-demand relationship for incidents of varying severity and during varying demands. A matrix relating number of lanes remaining, time of day, and stages of implementation could then be developed.

Coordination with all agencies involved in alternate route planning is of primary importance. It is essential that local agencies having jurisdiction over the surface streets to be used be brought into the planning process as early as possible. Their opinions and knowledge of the facilities complement established route development procedures. We do not want to run heavy traffic past hospitals or schools, through residential areas, or past the mayor's house if we can help it. Local police must be involved in the planning, for they will be involved in directing traffic. Agencies responsible for patrolling and maintaining the freeway must also be committed to the plan to ensure successful implementation and operation. Manpower requirements for directing traffic, barricading, and placing signing must be determined, and agreements on who does what must be reached.

Based on experience in incident management, we decided to put together all necessary information on each segment of freeway in the form of a map. A sample map is shown in Figure 1. Each map contains the following vital elements:

1. Identification of problem location,
2. Location of primary and secondary alternate routes,
3. Tabulation relating lanes remaining in service, time of day, and stages of implementation,
4. Manpower requirements and locations,
5. Required signing,
6. Necessary closures,
7. Responsible parties and telephone numbers, and
8. Special notes unique to this incident area.

To cover more than 475 miles of heavily traveled freeways will require some 2,500 maps. Keeping these maps up to date will be a major activity in itself, but the system cannot work without accurate, current information.

IMPLEMENTATION

Preplanning is an excellent tool, but, if it is not coupled with a means of implemen-

Figure 1. Sample map of alternate routes for incident on Ventura Freeway eastbound.

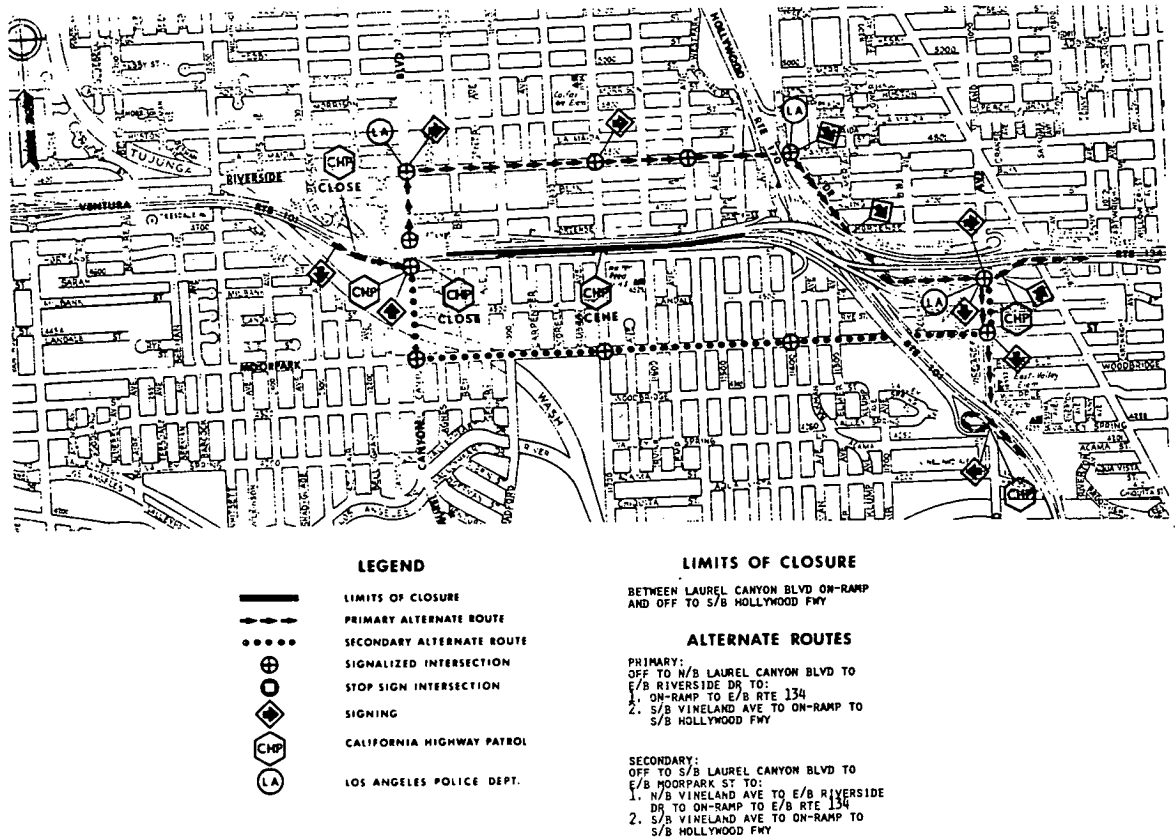


Table 1. Magnitude of delay-causing congestion on Los Angeles freeway network.

Type of Congestion	Delay (1,000 vehicle-hours per year)	
	Number	Percent
Recurrent, weekday peak	9,300	43-57
Nonrecurrent		
Incidents	5,000-10,000	30-47
Weekend	1,400	6-8
Holidays	600	3-4
Other	100	1
Total	16,400-21,400	100

tation and real-time management to provide proper on-the-spot adjustments, results could be counterproductive—sometimes even disastrous. We are meeting these needs through development and use of two operating concepts: the command post and the incident response team.

Command Post

An on-site command post, consisting of representatives from the agencies involved, is essential to effective management of major incidents. Development of this concept is a vital part of our alternate route efforts.

It is unfortunate that the goals of the agencies involved are often in conflict with each other. For example, consider the case of a vehicle fire in which firemen, in placing hoses, have unknowingly closed the primary alternate route. Conflicts such as this must be identified and resolved, and this is where the command post can be most effective.

In the command post concept the question arises, "Who is in charge?" Based on our active participation in incident management, this can best be answered with the question, "For which phase of the overall operation, at what location?" Face-to-face discussion with those responsible for the multitude of actions that must take place brings about a planned effort that best solves all problems and meets joint responsibilities by using joint authorities. Cooperation and coordination are the keys to success. We have been using this approach for more than a year, and it works.

Incident Response Team

Implementation of the plan involves establishing the alternate route and providing the signing, early warning capabilities, and the traffic flow expertise. To meet these needs, we have organized and staffed a response team in our Freeway Operation Branch that goes to the site of incidents estimated to block two or more lanes for 2 or more hours. Team members are traffic engineers and technicians and are available on a 24-hour basis. We use a truck carrying a changeable-message sign that can be strategically located to warn or inform motorists of the situation. Temporary signs, both metal and cloth, are carried in each response team vehicle; these are used to direct traffic along the alternate route and back to the freeway.

The procedures described here have been in use for a relatively short time and much is still to be learned, but, when we get all the pieces in place, the sequence of events will be as follows.

The first man on the scene, usually a traffic officer of the California Highway Patrol, reports the location, analyzes the situation, and estimates the duration of the problem. Communication centers then phone responsible parties as set forth in the plan, and the team assembles at the site and establishes the command post. At that time, a review is made, the appropriate stage of implementation is decided on, the alternate route is physically checked, and action is taken as called for in the plan. One or more changeable-message sign trucks are placed in the most advantageous location with proper message displayed; temporary signing directing motorists around the incident location is placed along the alternate route. Where necessary, traffic officers direct traffic off the freeway and through intersections. Then clearing operations commence. Monitoring and adjustment of the operation plan continue as directed from the command post. Information sources such as helicopters and traffic-monitoring devices, i.e., electronic surveillance with or without closed-circuit TV, can be most helpful to the command post in this phase.

Already some side benefits are emerging from this alternate route program. Knowledge of available routes and contacts with people in the field have been used in planning detours around construction and maintenance activities on the freeways. Many of the same procedures and techniques used in incident management apply to planned closures, and the public can realize similar savings in time, increased safety, and reduction of frustration.

SUMMARY

Preplanning for major freeway incidents by planning alternate routes and providing on-site management of incidents will not solve all congestion problems related to incidents. In many cases it will do little more than make the best of a bad situation. With relatively long-term incidents, it provides the starting point and allows us time to make more extensive arrangements. It can bring some sense of order to what is often a chaotic situation. Providing the whole package, including preplanning, the command post with the atmosphere for overall incident management, the hardware, and traffic expertise, represents a sound approach to solving an all too common problem.