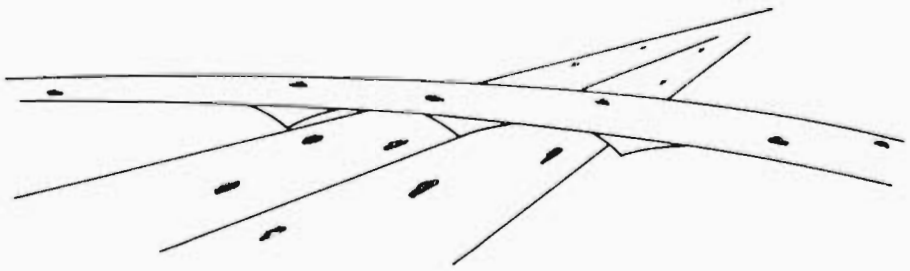

DEPARTMENTAL RESEARCH

Report Number : SS5.3

TRAFFIC HANDLING AROUND MAINTENANCE ACTIVITIES ON FREEWAYS

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

TRAFFIC HANDLING AROUND MAINTENANCE ACTIVITIES ON FREEWAYS

by

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District 12

Special Study No. 5.3

STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

Transportation Planning Division

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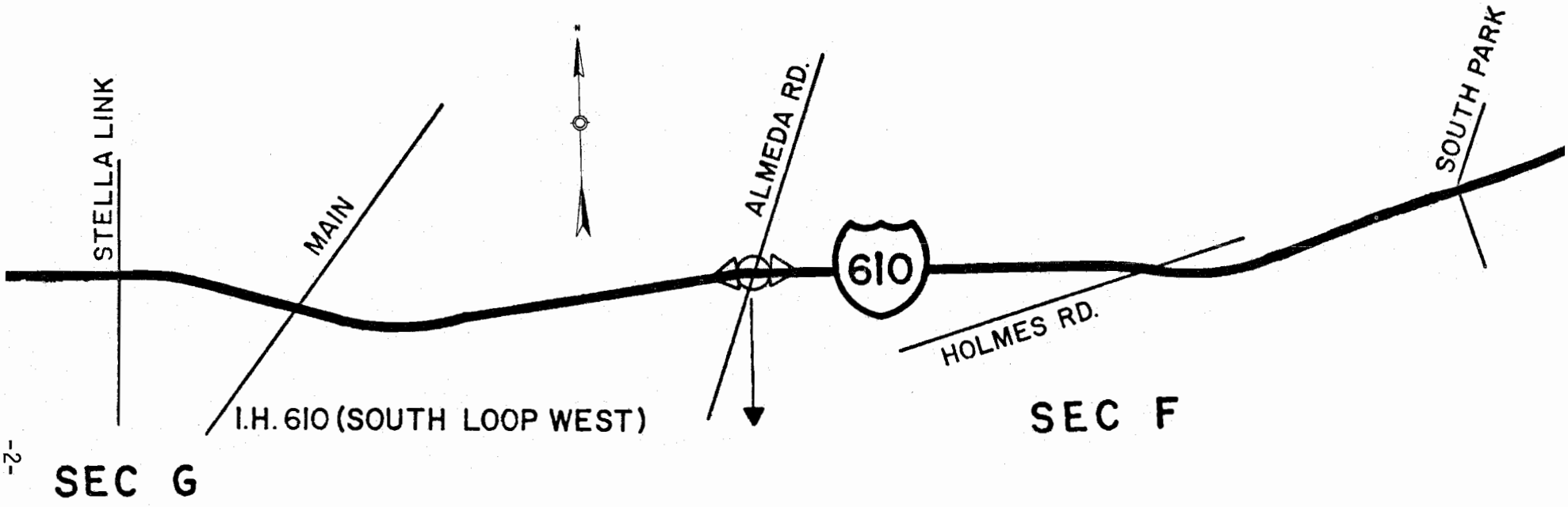
TRAFFIC HANDLING AROUND MAINTENANCE ACTIVITIES ON FREEWAYS

Due to increased travel on freeways in urban areas, much difficulty is being experienced during roadway maintenance activities. These difficulties manifest themselves in delay and increased accident experience. Because of the instability in traffic flow caused by maintenance activities, there also exists a greater danger to workmen involved in signing, flagging, and actual maintenance work.

Recent subjective analysis of conditions indicate that maintenance foremen are aware of the dangers and poor traffic conditions involved, but few are aware of traffic handling techniques which might be employed to improve these conditions. Their concern is mainly directed to the work involved and justifiably so. Work on main lanes must be planned with respect to materials, personnel, and time allowed to do the work. Once traffic has been slowed in the immediate area of the work, little or no concern is given to the queues which develop and the hazards facing the motorists.

Today's traffic demands on freeways indicate that the need may exist in the near future to do most work during times when traffic flow is light, perhaps during the hours of darkness. A recent check of traffic volumes at selected permanent count locations reveals that there are few locations in Houston where work involving lane closures can be done during the day without causing excessive queueing.

Figure 1 is a portion of a map of the freeway system showing the time of the day during which the closing of one or two freeway lanes will result in the traffic demand exceeding the remaining capacity of the freeway. When it is necessary to close freeway lanes, this map can be consulted to determine during what hours of the day these closures can be made without causing queueing. If lanes must be closed during hours when demand will exceed capacity, some arrangement for moving traffic should be provided. Additional capacity could come from adajacent frontage roads, city streets, or by using the shoulder for travel. Retiming of diamond interchange signals to improve



SECTION G

Congestion - ONE lane closed

Weekdays	Saturday	Sunday
7 to 9 A.M. 4 to 7 P.M.	NONE	NONE

Congestion - TWO lanes closed

Weekdays	Saturday	Sunday
6 A.M. to 8 P.M.	9 A.M. to 8 P.M.	Noon to 2 P.M.

SECTION F

Congestion - ONE lane closed

NONE

Congestion - TWO lanes closed

Weekdays	Saturday	Sunday
7 to 8 A.M. 3 to 7 P.M.	11 A.M. to 6 P.M.	NONE

Figure 1

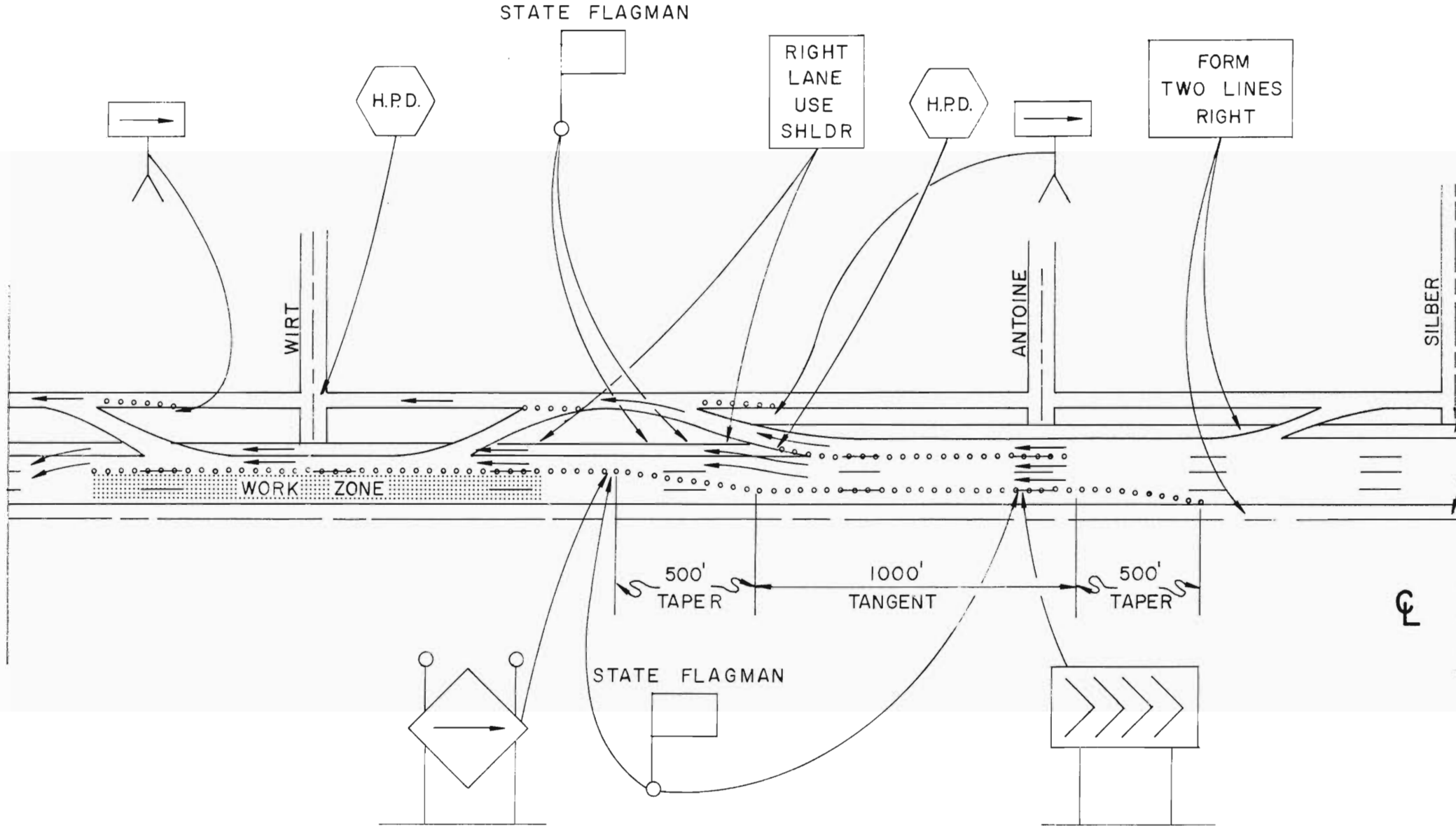
frontage road capacity can be accomplished to handle increased demands. By proper management coupled with traffic demand data, public announcements and new and creative signing, much can be done to reduce the effect of our maintenance activities on the motoring public.

An opportunity was recently afforded the Freeway Traffic Management Section to demonstrate that improved traffic conditions around maintenance activities could be realized. This demonstration involved traffic handling on IH 10 (Katy Freeway) during joint repair activities. In this instance, a special job foreman crew was employed to do the actual repairs. A section foreman crew provided for traffic handling under the guidance of the Freeway Traffic Management Section. A sequence of work was agreed to by all parites. Work was first undertaken on the outside outbound lane for its full length, approximately 5 miles, and next on the two inside outbound lanes.

A series of traffic volume counts were made to determine what the actual traffic demand was. This provided a basis for the techniques to be employed. Since this section of IH 10 had continuous frontage roads, a valuable alternate route was available.

The traffic counts (a series of 5-minute approach volumes) revealed that traffic demands were on the order of 1500 to 1600 veh/lane/hour for two lanes through the work zone. The effect of this was that with the assumed capacity of 1300 to 1400 veh/lane/hour, some reduction in demand would be necessary. Two methods were used to reduce this demand: 1) close upstream entrance ramps, and 2) capture and remove from the freeway, traffic in the outside lane prior to the work zone. This would eliminate the possibility of riding the knife edge with respect to capacity. Any instability in the work zone would not then be expected to rapidly deteriorate upstream traffic conditions.

Standard traffic warning signs as shown in Figure 2 were employed throughout the project. These signs were repositioned with respect to what actually was expected of the motorists at decision points.


STATE FLAGMAN
H.P.D.
RIGHT LANE USE SHLDR
H.P.D.
FORM TWO LINES RIGHT
WIRT
ANTOINE
SILBER
WORK ZONE
500' TAPER
1000' TANGENT
500' TAPER
STATE FLAGMAN

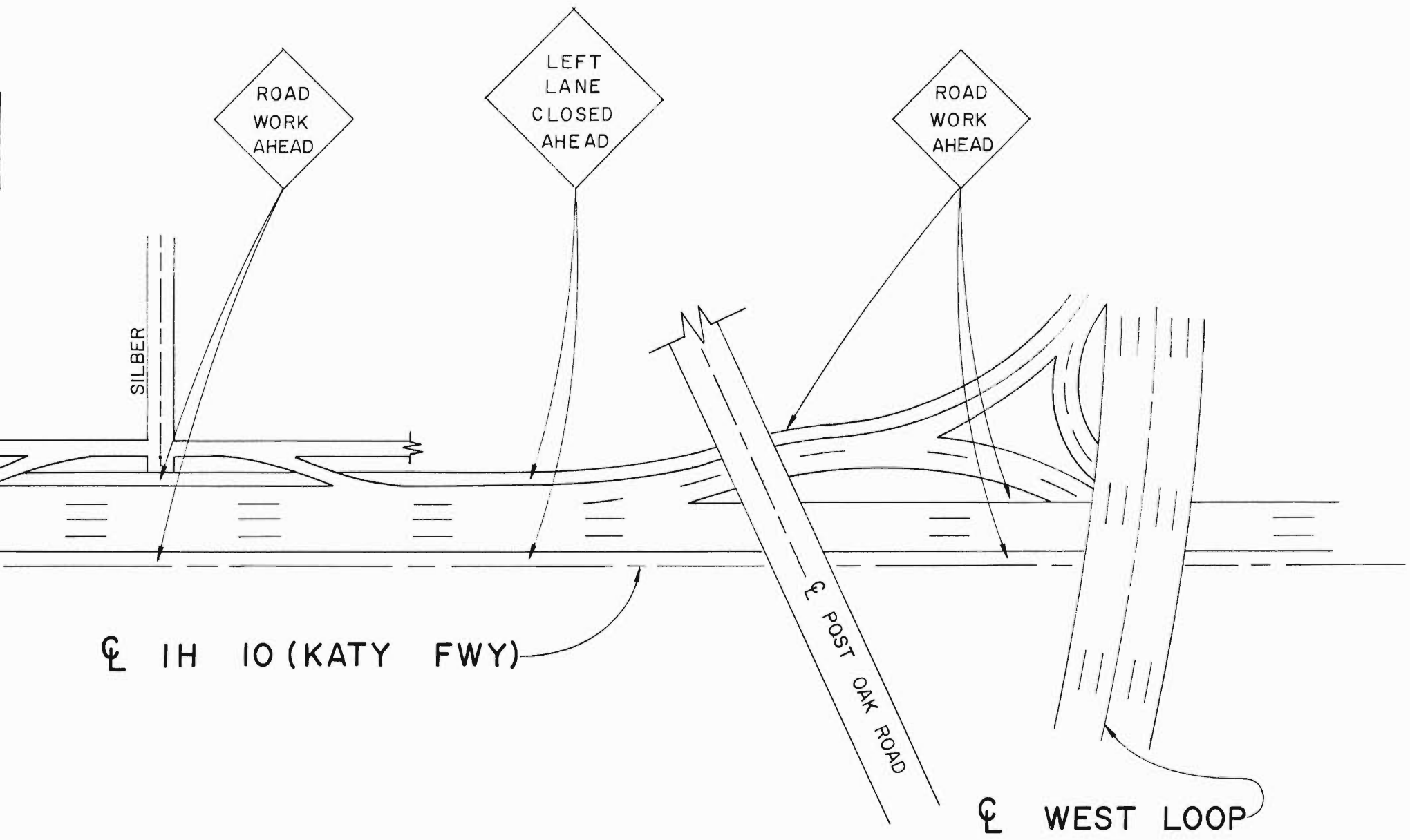

ROAD
WORK
AHEAD
LEFT
LANE
CLOSED
AHEAD
ROAD
WORK
AHEAD
SILBER
℄ IH 10 (KATY FWY)
℄ POST OAK ROAD
℄ WEST LOOP

Figure 2

As a result of conversations with City of Houston police officials, two police officers were provided to assist in handling traffic. At least five State flagmen were used. It was apparent that motorists were appreciative and more confident as to their movements with this added assistance.

During the lane closures, no excessive queueing occurred and traffic went through the work zone with little delay. Volume counts reflected demand volumes on the order of 1300/veh/lane/hour. Some difficulty was apparent in getting drivers to use the shoulder; but, relocating the RIGHT LANE USE SHOULDER signs and the flagmen notably improved this condition. The crew's morale improved notably also when they began to realize what we were attempting to do, and a flow of questions and comments indicating their interest was realized. In most cases, the speed of motorists was considered too high.

Figures 3 and 4 show the work in progress and the absence of a queue is apparent.

The more effective utilization of manpower, available capacity, and signs can be credited with the improvements realized during this demonstration. It should be pointed out that there was no increased cost to the State to achieve these results. Much more should be done, however, to improve our operations and this will increase our costs.

In the next few paragraphs, the author will attempt to lay the ground work for more improvement reflecting better use of the tools at our disposal.

SIGNS

It is apparent that the visual acuity of drivers is taxed on todays urban freeways. The driver's full attention is usually directed to his position with respect to other traffic in the stream, his route, speed, etc. Little time is available to him to see and comprehend the meaning of standard warning devices in advance of work zones. In order to capture his attention, we need consider new, more creative signs. These signs need not depart from standards with respect to shape, but should vary with respect to size and message content.

FIGURE 3

FIGURE 4

Figures 5, 6, 7, 8, and 9 show signs used in California and in Fort Worth, Texas. They have more target power than those considered standard and can better describe conditions ahead. Catchy messages can be employed to reveal a more human side of our work. These will not only demand more addition but may also improve our public image. Messages such as FREEWAY LANES CLOSED AHEAD, SLOW TO 33 MPH may seem ridiculous, but drivers will see the 33 and not 30. Signs such as WORK ZONE END 2000 FT. - HANG IN THERE will be more readily seen and appreciated than END WORK. Consider the sign used in Fort Worth, Figure 10. The sign is difficult to comprehend at first glance, but a driver will see the sign.

We should attempt to move away from standardization where changes can be used to our advantage.

It is also apparent that more mobile signs are required in order to minimize the time required to set up. On IH 10 during the demonstration the time required to set up signs and effect closure was between 1 to 1½ hours.

FLAGMEN

Far too often we employ too few flagmen at a location, and often the role of the flagman is looked upon as being a menial task with no hope of success. It is often apparent that our least experienced personnel are being given this responsibility without even the slightest idea of what they are doing.

This is one of the most important tasks around a work zone. It is through this direct contact that the driver is assured of what he is to do. If we are to maintain the operation desired, we should direct drivers at every decision point and then assure each driver that he has made the proper decision.

We desperately need to improve our training of these personnel. We should also consider clothing them differently from other personnel so they can be seen and used more effectively. White overalls, white hard hat and orange vests and flags might be appropriate.

FIGURE 5

FIGURE 6

FIGURE 7

FIGURE 8

FIGURE 9

FIGURE 10

POLICE

Police assistance is a valuable tool and provides the necessary authority to assure success. Police should be used wherever needed to improve operations. Their assistance in the quick removal of stalls and accidents is most important.

COMMUNICATION

It is also apparent that some form of personnel communication is necessary for proper coordination of work activities. Walkie talkie radios work well. Work zones on freeways cover long distances and, because of this, crews are often out of touch for extended periods of time, making it impossible to make changes.

INCIDENTS

Incidents (accidents and stalls) occurring within the zone of control can have a devastating effect on operation because they reduce whatever capacity is available. Emphasis must be placed on the rapid removal and recovery of traffic flow. In the case of a stall, the vehicle may be pushed as far as possible from the traffic stream, perhaps behind the cones, until it can be completely removed. Accidents present a different picture, but with police assistance, damaged vehicles can be removed completely from view quickly.

Consider how a recent experience was handled:

A driver lost control and hit the median barrier, leaving the vehicle inoperative immediately upstream of lane closure operation on IH 10. The police were there in seconds. A wrecker towing a Highway Department vehicle to a dealer for repairs happened to be in the queue that developed. Between the wrecker driver and the officer the decision was made to drop the State vehicle on the outer separation and pick up the damaged vehicle and remove it. This was all accomplished in less than three minutes, and traffic flow recovered quickly.

Consideration should also be given the possibility of organizing a separate special task group with its major activity being to provide for traffic handling around maintenance activities on urban freeways. This would allow for the most efficient use of men, training, and materials in carrying out this important task.