Joint Operational Management of an HOV Facility: A Success in Houston

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ABSTRACT

The Harris County Metropolitan Transit Authority and the Texas State Department of Highways and Public Transportation have jointly managed a combination contraflow and concurrent-flow high-occupancy vehicle (HOV) facility for the past 4 years. The management structure by which the two agencies oversee the daily operations of the facility is discussed. An Operational Agreement and an Operations Plan detail each agency's responsibilities. Of primary importance is the establishment of a Contraflow Project Management Team as the responsible body for daily management of the facility. This successful joint management of the contraflow and concurrent-flow lane has had a positive impact on other interagency transportation-related efforts. It is expected that by 1990 more than 40 miles of HOV treatment will have been jointly constructed by the Metropolitan Transit Authority and the Texas State Department of Highways and Public Transportation.

The Metropolitan Transit Authority of Harris County (METRO) and the Texas State Department of Highways and Public Transportation (TSDHPT) have jointly constructed and operated a combination contraflow and concurrent-flow high-occupancy vehicle (HOV) lane facility to serve the commuting needs of northern Harris County residents. The administrative structure and process by which these separate government agencies jointly manage daily operations of this facility are presented.

PROJECT DESCRIPTION

On August 28, 1979, METRO, in cooperation with TSDHPT, began operation on a contraflow lane on the North Freeway as one element of a comprehensive corridor transportation improvement program. UMTA funded the project with a $2.1 million Sections 5 and 6 Service and Methods Demonstration grant (as provided by the Urban Mass Transportation Act of 1964, as amended).

The contraflow lane operation of the North Freeway extends north from downtown Houston to the North Sheperd interchange, a distance of 9.6 miles. The contraflow lane is available for use by authorized buses and vanpools traveling inbound on the North Freeway between the hours of 6:00 and 8:30 a.m. and outbound between 4:00 and 6:30 p.m.

The North Freeway contraflow lane has a number of unique features that make it a more ambitious project than other HOV contraflow lane projects. Specifically, these include the following:

1. At 9.6 miles, the project is the longest attempted;
2. The project operates during both morning and afternoon peak periods; and
3. The project is available only to vehicles that are authorized in advance.

On March 30, 1981, the existing contraflow lane operation was enhanced by the addition of a 3.3-mile concurrent-flow lane (morning inbound only). The concurrent-flow lane terminates at the contraflow lane entrance at North Shepherd and extends morning priority treatment north to West Road, approximately 3.3 miles from the contraflow entry. This extension is shown in Figure 1. The cost to METRO and TSDHPT of implementing this additional corridor improvement was about $130,000, and all of it was from local sources.

In addition to the contraflow and concurrent-flow improvements to the North Freeway, METRO currently operates four park-and-ride lots (see Figure 1) in the North Freeway corridor. Transit service provides a total of 222 daily bus trips during the morning and evening operating periods. Likewise, the HOV facility serves approximately 350 authorized vanpools per operating period. Daily ridership for both buses and vanpools is currently 15,500 passenger trips daily.

To date there are three other contraflow operations nationwide: the Long Island Expressway in New York, the I-495 approach to the Lincoln Tunnel in New Jersey, and the US-101 Golden Gate approach to San Francisco. Of these facilities, only one is a joint local government project. The Lincoln Tunnel contraflow lane is a joint project between the Port Authority of New York and New Jersey and the New Jersey Department of Transportation.

SCOPE OF PAPER

The purpose of this paper is to discuss the joint operations management of the North Freeway contraflow lane project in Houston. In addition, the impact of this success on other interagency transportation-related efforts in Houston is presented.

First, the Operations Agreement and Operations Plan adopted by TSDHPT and METRO are outlined. These documents specify the responsibilities to be carried out by the two agencies. Responsibilities include the creation of a Contraflow Project Management Team that oversees the operations of the contraflow and concurrent-flow facilities. Second, a discussion of the matters faced by the Contraflow Project Management Team during the first 4 years is presented. Issues raised at the bimonthly meetings primarily involve law enforcement on the HOV lane, maintenance activities, operation policies, and physical modifications to the HOV lane that would improve HOV or adjacent freeway operation. Third, the impact that the successful management of this interagency project has had on other interagency transportation efforts in Houston is highlighted. Finally, a discussion is offered on the positive and negative aspects of an interagency approach to the development and operation of future HOV facilities.

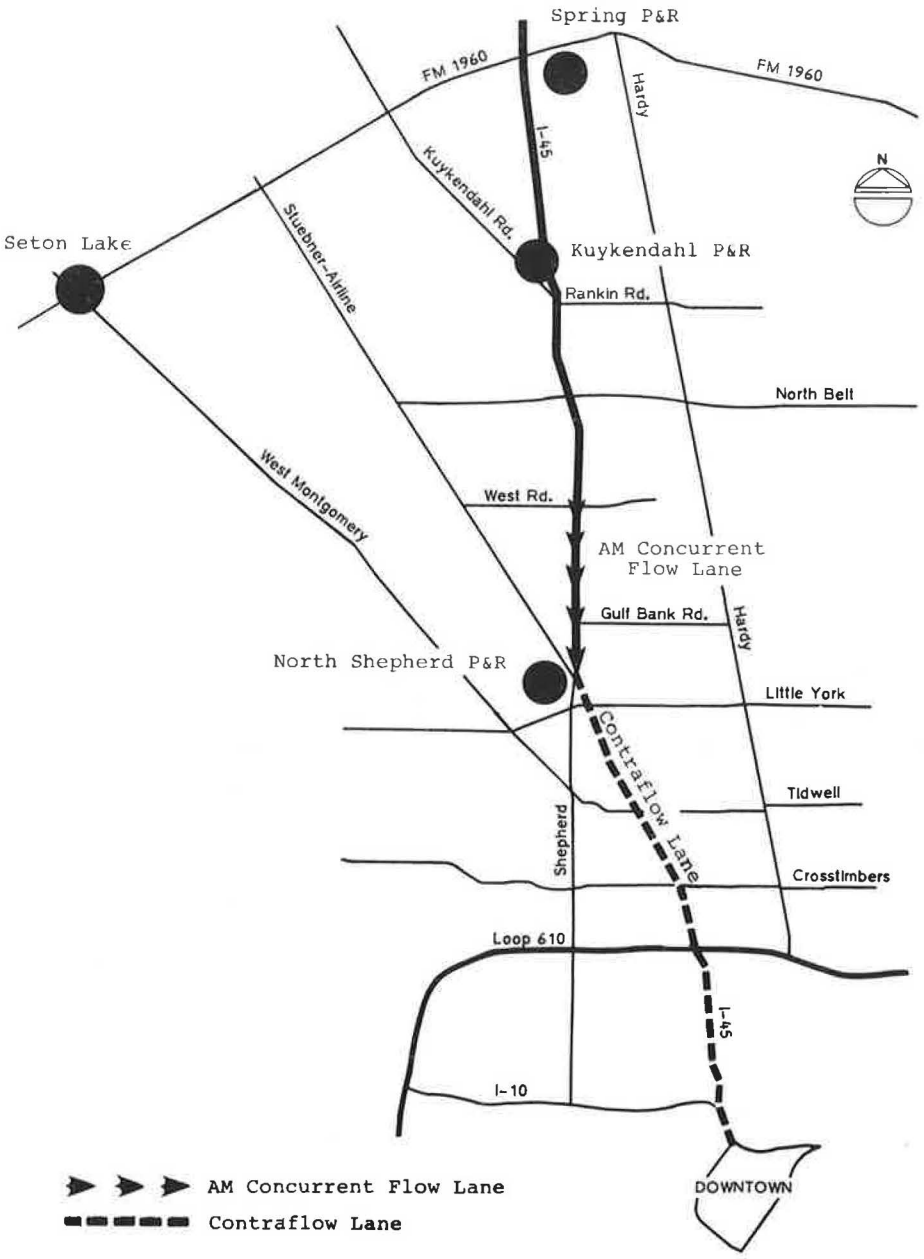

FIGURE 1 Contraflow and concurrent-flow lanes.

OPERATIONS AGREEMENT

The Operations Agreement defines the individual responsibilities that each agency has to the project. Deriving its focus from the expertise of each agency, surface and structural maintenance of the HOV facility is provided by TSDHPT, and the daily operation management of the facility is provided by METRO.

The predominant feature of the Operation Agreement was the establishment of a Contraflow Project Management Team that oversees all aspects of the HOV lane. Each agency was required to appoint one person who would serve as project manager. Bimonthly meetings are held to review operation policies and to address matters that require action or analysis.

All rules and regulations regarding use of the contraflow lane by authorized drivers are established and enforced by the Contraflow Project Management Team, as stated in the Operations Agreement. Regulations such as speed limits, individual qualifications for driver authorization, and vanpool ridership capacity requirements are jointly determined by METRO and TSDHPT. Any issues regarding policies or procedures are also channeled through the Team. The policy of having the project manager as the only recognized communication link was intended to minimize miscommunication between METRO and TSDHPT.

CONTRAFLOW MANAGEMENT ISSUES

The Contraflow Project Management Team meets on a bimonthly basis to oversee daily operational issues. The following discussion highlights some of the issues that have been raised at Team meetings. These are categorized as follows:

1. Operational modifications to the contraflow lane,

2. Maintenance of the contraflow and concurrent-flow facility, and
3. Carpools.

Operational Modifications to Contraflow Lane

Although the HOV facility was initially successful, the Contraflow Project Management Team did realize that certain operational modifications could further improve performance. Two notable operational modifications to the facility that were discussed at the Team meetings are briefly described.

Implementation of Concurrent-Flow Lane

During the planning and initial operations of the contraflow lane, traffic congestion in the morning peak started to extend several miles past the northern terminus. Consequently, the Team decided that it was necessary to consider means of extending priority treatments further north during morning operation. Unacceptable traffic conditions upstream of the existing limits prevented the borrowing of a lane for an extension of contraflow operations (1).

The Team decided that the median shoulder could be used as a concurrent-flow lane for the authorized contraflow users during the morning peak. The concurrent-flow lane could extend 3.3 miles. Median drainage inlet and median superelevations prevented any further extension.

TSDHPT subsequently designed necessary signing and striping modifications to convert the median shoulder for bus and vanpool use. Median pavement integrity was sufficient to support vehicle traffic. A connection ramp was designed at the downstream terminus to facilitate direct access from the concurrent-flow median shoulder to the entry of the contraflow lane. An exception was granted from Interstate standards by the FHWA in fall 1980 to use the median as a temporary lane during a 2.5-hr period each day. Project implementation was expedited by use of local monies from both agencies to fund construction. TSDHPT installed signs, restriped lanes to accommodate the lane over bridge decks, and reinforced bridge railing. METRO constructed a connection ramp and gate. The total cost to both agencies was about $130,000. Construction began in November 1980 and was completed about 4 months later.

As a measure of success of this facility, 90 percent of the contraflow ridership originates from the concurrent-flow lane. Travel time savings for users of the concurrent-flow lane range between 3 and 5 min.

Implementation of Simultaneous Setup Procedure During Contraflow Deployment

METRO has an 18-member crew that sets up and takes down the HOV facility in both the morning and afternoon hours of operation. Setup and takedown times following operation periods ranged from 1 to 1.5 hr.

This 1- to 1.5-hr transition time from mixed-flow operation to contraflow operation was perceived by the public as an indication of unsatisfactory use of the freeway. The congestion experienced by off-peak motorists further compounded the public's misconception. As a result of this negative public feedback, the Contraflow Project Management Team recognized the need to minimize the transition time.

The Team determined that construction of median operations north and south of the I-610 interchange would enable METRO's crews to set up and take down separate sections of the contraflow lane simultaneously. Figure 1 shows the relative proximity of I-610 interchange to the termini of the contraflow lane.

The $60,000 cost for the two median openings was shared by METRO and TSDHPT. It was incorporated into an existing construction project to rehabilitate the I-610 bridge structure. The simultaneous operation required no additional personnel or equipment.

The set-up and take-down times were essentially cut in half by the implementation of the simultaneous set-up and take-down procedure. Consequently, a reduction was achieved in the total time that the borrowing of a freeway lane from mix flow traffic is required.

Maintenance of Contraflow and Concurrent-Flow Facilities

Each agency's maintenance responsibilities for the contraflow lane were detailed in the Operation Agreement for the lane. These tasks were divided according to the strengths and resources of each agency.

Maintenance responsibilities of METRO to the contraflow lane included safety posts and holes, gates, beacons, lamps, pylons, service poles, control switches, signal controllers, and changeable message signs. These traffic control devices were installed as part of the original $2.1 million construction project. METRO's field crew(s) and electrical contractor are responsible for these tasks.

Maintenance of the roadway surface and structures within the limits of the contraflow lane, which were not installed with the construction project, are the responsibilities of TSDHPT. In addition, maintenance of the needed signs and striping for the concurrent-flow lane are the responsibility of TSDHPT.

As METRO's staff is involved on a daily basis with the operation of the contraflow lane project, the Team meetings provide a needed forum for communication of maintenance-related issues to TSDHPT.

Carpools

The contraflow lane is reserved for the use of authorized buses and vanpools only. Persons advocating the use of carpools on the contraflow lane petitioned METRO to modify the existing authorization policy to include three-person carpools.

The Contraflow Project Management Team was requested to investigate the possibility of carpool use and make a recommendation to its feasibility. Local politics played a role in determining the final recommendation. By using existing operations data, the Team examined the issue from the viewpoint of (a) possible need for facility modification, (b) impact on enforcement, and (c) performance (i.e., increase of person trips versus increase of vehicles).

Analysis indicated that the existing facility would have to be modified with additional storage lanes and violator ramps. Unlike buses and vanpools, authorized carpools would be difficult to distinguish from nonauthorized passenger cars. Additional storage lanes for vehicle inspection would be required. The additional cost for the needed storage lanes and violator exit ramps would change substantially what was initially considered a low-cost capital project.

The number of persons who would be transported by carpools was considered nominal. It was determined that the extra capital cost and increased enforce-

ment outweighed the benefits of authorizing carpools to use the contraflow lane.

Based on the results of this analysis, the Team recommended to the respective administrations that carpools not be allowed to use the contraflow facility. The administration concurred with the Team's recommendations and upheld the carpool restriction.

IMPACT OF CONTRAFLOW PROJECT MANAGEMENTS' SUCCESS ON OTHER TRANSPORTATION-RELATED EFFORTS

The successful management of the North Freeway contraflow lane project created a unique spirit of cooperation between METRO and TSDHPT. This interagency cooperation formed the basis for other joint transportation-related endeavors:

1. Future HOV facility development,
2. Activities of a Houston Traffic Management Team, and
3. Overall system management of transportation facilities.

Future HOV Facility Development

Although the contraflow lane project has proved successful, it is only planned as an interim improvement to the North Freeway corridor. It was foreseen from the outset of the project that the borrowing of a lane from the off-peak direction would inevitably result in an unacceptable level of congestion in that direction. A study performed by the Texas Transportation Institute recommended that the contraflow lane not remain in operation past 1984, and that a median that physically separated the HOV lane be constructed in its place (2).

In addition, the yearly cost to METRO for the setup and takedown of the contraflow lane approaches is $600,000. Consequently, a facility that was not as labor intensive could significantly reduce the yearly operational expenses that were incurred. A barrier-protected HOV lane replacement could cut deployment costs by 75 percent or more.

For these reasons TSDHPT and METRO initiated efforts toward the development of the median transitway. TSDHPT also decided to incorporate programmed improvements to the freeway main lanes and parallel frontage roads as part of this one-time effort. Construction on the first phase of this replacement began in July 1983. The first section of the median busway should be completed by 1985. It is anticipated that overall construction along the North Freeway corridor will be completed in 1988.

The North Freeway project is only one of three transitway projects that are being jointly developed by the two agencies. As indicated by the data in Figure 2, by 1990 more than 40 miles of transitways will be constructed in medians of area freeways. This represents an investment from local, state, and federal sources of more than $150 million.

As indicated previously, all of these projects use the existing strengths of the two agencies. TSDHPT has the primary role of design supervision and construction management, whereas METRO has staff and resources to operate the facility and expedite development with local funding for design. Both agencies participate in the plan preparation process through joint project advisory teams. Representatives from the Houston Traffic and Transportation Department, the Houston/Galveston Area Council, the staff consultants, and the FHWA are members of the coordinating team.

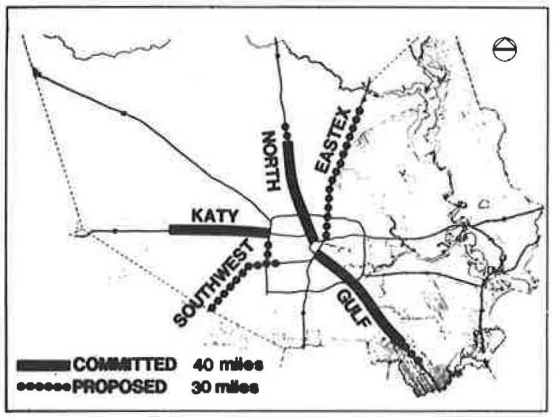

FIGURE 2 Committed and proposed transitways.

Activities of the Houston Traffic Management Team

Based on the success of the San Antonio corridor management team (3), it was apparent that the Contraflow Project Management Team provided a good start toward the creation of a similar team in Houston. The corridor, or traffic, management team represents an interagency approach toward solving transportation operational problems at the staff level.

The Houston Traffic Management Team is comprised of representatives from Harris County law enforcement agencies; city, county, and state transportation departments; and METRO. The Team meets monthly to discuss such topics as the review of traffic control strategies for major urban rehabilitation projects, review and approval of proposed operational changes to existing facilities, and operational problems encountered by law enforcement officials (4). An example of the Team's activities is presented in the following paragraphs.

The Team considered a proposal to restripe an extremely congested major thoroughfare from three 12-ft lanes in each direction to four 9-ft lanes in each direction. This arterial carries almost 80,000 vehicles per day. The Team reviewed a video tape of traffic flow on this arterial during peak periods. (This video tape was taken by one of the member agencies.) On review of this footage and consideration of the relatively insignificant level of bus and truck activity on this road, the Team agreed that the proposal, though radical, was appropriate. The involved agencies then took the steps necessary to accomplish the restriping. The Team continues to receive reports of the success of the restriping through reports from law enforcement and traffic engineering Team members. In addition, the Team favorably reviewed some time-lapse photography footage on this roadway after the narrow-lane operation was implemented. It was noted that bus and truck traffic was not adversely affecting traffic operations. (This footage was taken by another member agency.)

The most important result of the Team's activities since its inaugural meeting in January 1981 is the communication links that have been established between all transportation-related agencies within Harris County.

Regionwide Freeway Surveillance and Control System Development and Management

Part of the plan preparation for the transitway projects includes the design of the surveillance and control system for the operation of these facili-

ties. The control system to be used on all transitway projects would be comparable to those systems operating on freeways in Detroit and Los Angeles.

Although the initial installation of conduit and data-communication equipment is being accomplished primarily for the operation of the transitways, this equipment has the capacity to be used for freeway and arterial traffic management.

Some of the design work for transitway surveillance and control is being performed by TSDHPT. This represents another example of the existing strength of an agency being utilized. In this case the Department's Automation Division, which has developed computerized traffic signal systems within Texas, is developing the software for the system. TSDHPT anticipates expanding on the base system that will be installed through the transitway projects. Consequently, the potential will exist for the joint operational management of the corridor.

CONCLUSION

METRO and TSDHPT have successfully managed the North Freeway contraflow lane project. This joint management approach has several advantages.

1. The resources of each agency are effectively used. METRO provides the operational support, whereas TSDHPT provides roadway maintenance.
2. Limited economic resources can be combined to finance capital projects. The North Freeway transitway project, which will replace the existing contraflow facility, is being financed with funds from FHWA, UMTA, TSDHPT, and METRO. The total project cost is $130 million, which includes improvements to freeway and frontage roads.
3. Joint agency projects enable the transportation needs of a corridor to be more effectively addressed. As part of the contraflow lane project TSDHPT installed ramp metering signals at all entrance ramps within the contraflow and concurrent-flow lane to improve mixed-flow traffic movement and help minimize the negative impacts of contraflow to main-line traffic.

Joint agency management of a project is not without its shortcomings. Joint projects require review and approval by each participating agency. This increase of bureaucratic review requires greater lead time to develop and implement a project.

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Publication of this paper sponsored by Committee on Freeway Operations.