Exclusive Bus Lanes

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A method of providing added capacity in the peak direction on streets with heavy bus volumes is by the use of exclusive bus lanes. Although this does not always provide added capacity for trucks or passenger vehicles, it does permit more efficient bus service. This can make bus travel more attractive, thereby increasing the number of people who ride the bus rather than drive. Such lane usage can be either full-time or part-time and is usually restricted to streets where a lane of buses would carry as many people as a lane of automobiles. It must not interfere with necessary traffic movements or access to street frontage.

The most obvious advantage of the exclusive bus lane is its ability to improve bus speeds substantially through the most congested areas. It can also help to reduce congestion by separating the slow-moving and frequently stopping buses from the rest of the through traffic. Although it is relatively inexpensive to install and maintain, it does require continual enforcement to prevent misuse of the lane by unauthorized cars and trucks. Another possible disadvantage is the fact that it usually reduces the number of moving lanes available to the rest of the traffic. If the curb lane is used, it can make right turns difficult and street access loading zones impossible during the hours of operation. If one of the center lanes is used, it will greatly facilitate right turns, but it can create pedestrian hazard zones in the bus loading areas. On two-way streets such a lane will make left-turn maneuvers rather difficult.

Special-use lanes can be designated either by signs over the exclusive lane or next to the lane on light poles or pedestals. These signs will usually be supplemented by distinctive paint markings and special messages painted directly on the pavement. In center lane operations, pedestrian safety islands are usually delineated in the middle of the street. These islands should offer some physical protection to the waiting passenger, particularly if the bus lane is in effect all day long. Whether the lane is in effect all day or just during rush hours, successful operation requires constant and fair police enforcement and a good program of public relations.

EXPERIENCE IN CITIES

Exclusive bus lanes have been installed in many cities. Chicago has had considerable success with its 7-block long Washington Street bus lane in the heart of the Loop. Washington Street is a five-lane one-way street, and the exclusive bus lane is the center lane. It is designated by special pavement markings and pedestal signs, and most of the passenger loading zones have protective railings and splash guards along the outside of the zone. The Chicago Transit Authority has reported a speed-up in transit operations from 14 to 28 percent.

Rochester, N. Y., uses a 2-block exclusive bus lane during the evening rush hours only. A saving of 30 minutes loading time in the peak 2-hr period is reported.

An 8-block stretch of Baltimore's one-way Cathedral Street uses an exclusive bus lane during both the morning and evening rush periods. The city has experienced a 17 to 22 percent speed-up of transit travel and a 39 percent speed-up of other traffic.

Atlanta's Peachtree Street was reconstructed for 4 blocks, adding one more lane (from 4 to 5) and designating the curb lane for buses only during the rush hours. Buses were speeded up 4 percent in the morning rush and 33 percent in the evening, while general traffic was speeded up 110 and 61 percent, respectively.

TABLE 1

EXCLUSIVE BUS LANES

City	Streets	Description	Time	Results
Chicago, Ill.	Washington Street (one-way)	7 blocks long, one lane in center of 5-lane street	All day	14-28% speed-up in transit operations after 5 months
Rochester, N.Y.	Main Street	Initially one block, later extended from Plymouth to Goodman	4-6 p.m.	Saving of 30-min loading time in peak 2-hr period
Baltimore, Md.	Cathedral Street (one-way)	8 blocks long	7:30-10 a.m. 4-6 p.m.	17-22% speed-up of transit travel; 39% speed-up of other traffic
Atlanta, Ga.	Peachtree Street	4 blocks of northbound lane; at the same time, street was changed from 4 to 5 lane operation	7-9 a.m. 4-7 p.m.	Buses speeded up 4-33%; general traffic speeded up 61-110%
Birmingham, Ala.	Third Avenue	8 blocks long	7-9 a.m. 4-6 p.m.	40% decrease in accidents involving transit vehicles; 27.7% decrease in bus travel time; 29% decrease in auto travel time; gain of 394 parking hours per day downtown
Peoria, Ill.	Adams and Jefferson Streets	Adjacent one-way arteries, 4 blocks each	3-6 p.m.	25% speed-up in transit service; 10% speed-up for other vehicles

Birmingham's Third Avenue has an exclusive bus lane for eight blocks every morning and evening rush period. A 40 percent decrease in accidents involving transit vehicles, a 27.7 percent decrease in bus travel time, a 29 percent decrease in auto travel time, and a gain of 394 parking hours per day in the downtown area are reported.

In Peoria, Ill., Adams and Jefferson Streets are adjacent one-way arteries. Both have used exclusive bus lanes during the evening rush hours only. A 25 percent speed-up in transit service and a 10 percent speed-up for other vehicles have resulted.

Data on results of exclusive bus lanes are summarized in Table 1. Additional information can be obtained from the American Transit Association.

CONCLUSIONS

Exclusive bus lanes have been installed in many cities with varying degrees of success. These special-use lanes improve bus speeds substantially through the most congested areas, but they do require continual enforcement to remain effective and reduce the number of moving lanes available to the rest of the traffic. The cities summarized in Table 1 are only those cities that have been relatively successful with their use of exclusive bus lanes.

REFERENCES

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3. Traffic Considerations in Planning of Central Business Districts. Traffic Engineering, Report of ITE Project Committee 6D, pp. 40-43, June 1964.
4. Traffic Engineering Handbook. Pp. 565-568, 1965.

Addenda

PHOENIX, ARIZ.

Figure 1. Recessed bus bay, Phoenix, Ariz.

Figure 2. Recessed bus bay, Phoenix, Ariz.

DENVER, COLO.

The "skip-block" bus stop design in downtown Denver was installed to provide a bus stop for each block, taking into account the mandatory right-turn lanes every other block in the one-way grid. A schematic drawing of the downtown area (Fig. 3) shows the skip-block bus stops and double-turn locations. Two stops in one block are provided, but no stops in the following block because of the mandatory-turn lane in the following block. However, the net effect is to provide one stop per intersection, alternating near side and far side locations.

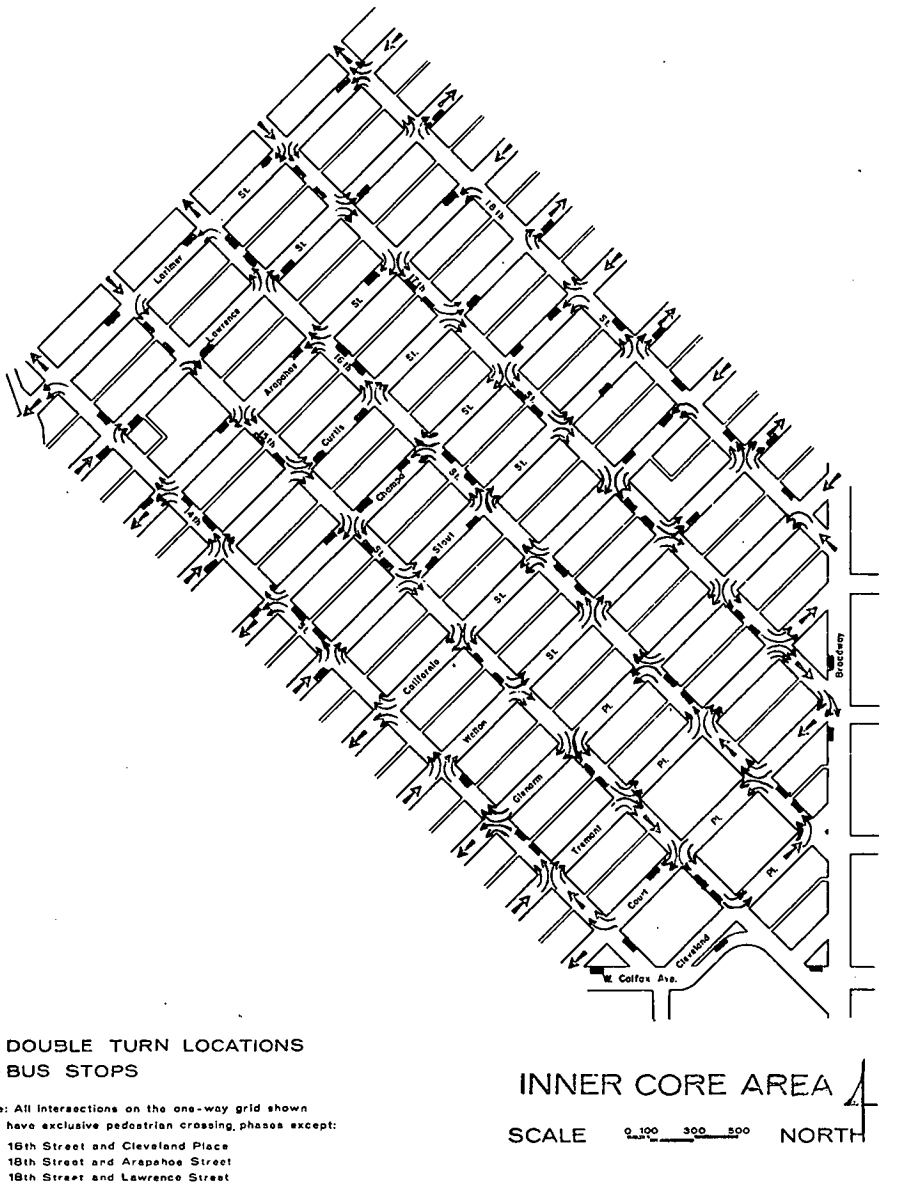

Figure 3. Inner core area traffic control, Denver, Colo.

WASHINGTON, D. C.

In Washington, D. C., a number of streets are paved with asphalt and a concrete bus bay is provided. The real answer to preventing creeping or slippage in a bus stop area is the construction of a concrete slab. Figures 4 and 5 show typical bus bays in the District of Columbia. Figures 6 and 7 are before and after photographs of a recessed bus bay.

Figure 4. Bus bay, Washington, D.C.

Figure 5. Bus bay, Washington, D.C.

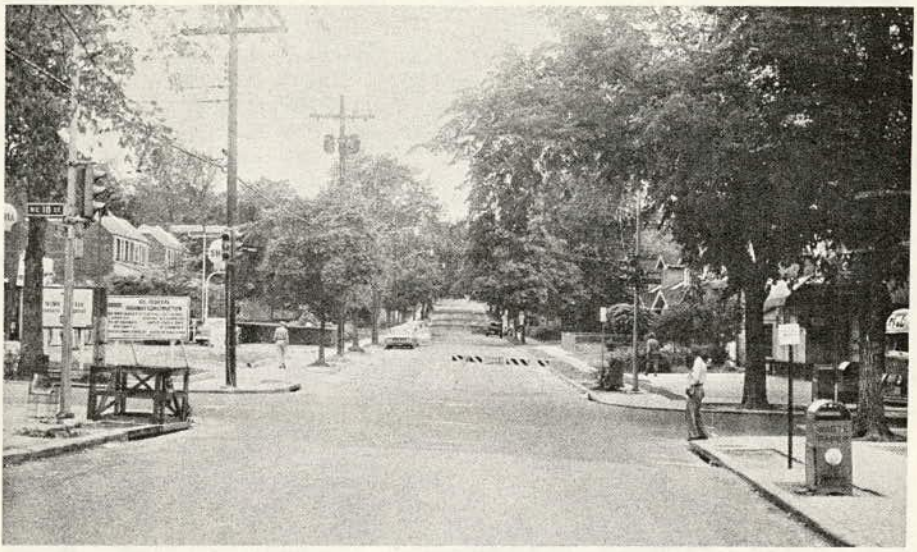

Figure 6. Before bus bay construction.

The following description tells the complete story on the Pennsylvania Avenue, S.E., plan. Actually the key to this program was the elimination of curb parking during the peak hour only in the direction of major traffic flow. This in fact made the curb lane available for the heavy bus operation. No special signs or pavement markings were required since the sheer volume of buses makes the curb lane practically an exclusive bus lane.

Figure 7. After bus bay construction.

IMPROVING QUALITY OF TRAFFIC FLOW

Pennsylvania Avenue, S.E., from the U.S. Capitol to Anacostia River is an important thoroughfare serving downtown Washington. Originally buildings along the Avenue were row houses for single-family occupancy. Land has been rezoned for a community business center class. Many of the old row houses have been converted to offices and small businesses. A few have been retained for residential property. In most cases, people live on the second and third stories. There are two theaters, one or two supermarket-type stores, several gasoline stations, a bank or two, and a school or two along the Avenue. But for the most part the buildings are still of the original construction with narrow frontages along the street.

The street consists of two 38-ft roadways separated by a wide planted median. Each roadway was marked for four traffic lanes. The total length is 1.3 miles.

Situation in 1965

By summer 1965, traffic congestion had become so bad that people were complaining to District officials. Complaints were sufficiently numerous to warrant a special study by the Bureau of Traffic Engineering and Operations.

Traffic volumes did not seem overly great. There had been little change in volumes for several years. Counts indicated some 34,000 veh/day for traffic moving in both directions. The worst tie-ups were occurring between 7:00 and 9:30 a.m. and 4:00 to 6:30 p.m. Traffic moved orderly and without delay during the balance of the day. Traffic during the morning and afternoon rush periods (westbound from 7:00 to 9:30 a.m. and eastbound from 4:00 to 6:30 p.m.) amounted to 4200 and 3700 vehicles, respectively.

The posted speed limit was 30 mph. Average overall speed was found to be under 20 mph for each of the periods of peak-traffic flow. Throughout the balance of the day traffic moved along at around 28 mph.

Regulated parking spaces had been laid out as requested by businessmen and residents to serve their needs. A total of 177 marked bays was provided along the north curb line for westbound traffic and along the south curb line for eastbound traffic. These spaces had time limits imposed to permit and encourage turnover parking. This timing made 442.5 vehicle-hours of parking available for the morning and afternoon peak periods, if properly used. By actual count, it was found that these spaces were being used to only 57 percent of capacity. The greatest number of vehicles parked along the curb on one side of the street in the whole 1.3 miles at any one time was 78. These were found in the eastbound roadway one afternoon between 4:00 and 6:30. There were times during the morning peak period of traffic flow, when no more than 13 vehicles were parked in the curb lane for westbound traffic. Yet, these few vehicles were reducing the effective width of the roadways from four to three lanes. As a result, traffic, inbound and outbound, was backed up each morning and afternoon.

Recommend Remedial Changes

A review of facts collected revealed that (a) over 20 percent of the total traffic in 24 hours was crowded into three lanes, 5 hours a day, and (b) elimination of parking, in the direction of major flow, only $2\frac{1}{2}$ hours in the morning and afternoon, would provide an additional lane for traffic.

Parking in the direction of major flow was prohibited Mondays through Fridays. This regulation was promulgated on February 23, 1966. To compensate for the lost parking spaces additional parking regulations were instituted on neighboring side streets. Four free lanes were made available for movement of traffic in the direction of major flow during peak periods in place of the three lanes for movement and one for parking previously in use.

Situation in October 1966

The only changes made in conditions on Pennsylvania Avenue, S.E., were those pertaining to inbound traffic in the morning and outbound traffic in the afternoon for Mondays through Fridays. All studies were designed to measure before and after effects

TABLE 2

NUMBER AND COST OF ACCIDENTS ON PENNSYLVANIA AVENUE, S. E.[a]

Severity of Accident and Type of Collision	Unit Cost[b] ($)	1965		1966	
		Number	Total Cost ($)	Number	Total Cost ($)
Property damage only:					
Rear-end	600	3	1,800	8	4,800
Side-swipe	400	13	5,200	17	6,800
Personal injury:					
Rear-end	1,800	3	5,400	3	5,400
Pedestrian	2,400	3	7,200	1	2,400
Total		22	19,600	29	19,400

[a]Between 2nd and 15th Streets, in the direction of major traffic flow (westbound from 7:00 to 9:30 a.m. and eastbound from 4:00 to 6:30 p.m.), Mondays through Fridays, March through September.

[b]Source: Washington Area Motor Vehicle Accident Cost Study, 1966.

as applied to these two periods of time. A systems effectiveness study was made to evaluate quality.

1. There was a slight increase in traffic volume: inbound 7:00 to 9:30 a. m., 4400 vehicles and outbound 4:00 to 6:30 p. m., 3900 vehicles.
2. Overall travel time was reduced by 23 percent.
3. Delay due to stopping, idling and starting was reduced by 54 percent.
4. Congestion, measured by traffic density (vehicles per mile of roadway) was reduced by 29 percent.
5. Travel cost was reduced by 23 percent for a net saving of $56,000.

D. C. Transit Company made a study of overall travel time of their buses. Removal of the parked vehicles at the curb resulted in a reduction of bus travel time of 10 percent.

Accident experience before and after the changes indicates there was no significant change. The only accidents that could have been affected by absence or presence of vehicles parked at the curb are those happening along the roadway. Collision types would be rear-end, side-swipe, parked vehicle or vehicle maneuvering to park, fixed object or pedestrian. Since parking of vehicles on the Avenue has no influence on traffic in the cross streets, angle collisions in the intersections were eliminated from the study. The study period was March through September 1966. To be consistent, accident records for the same months in 1965 were reviewed. Metropolitan Police reports indicated there were 29 accidents in the specified collision types. This is seven, or nearly one-third, more than occurred in 1965. When analyzed in the light of severity and cost (Table 2), this difference is really not significant.

CONCLUSIONS

Vehicles parked at the curb on Pennsylvania Avenue, S. E., from 2nd to 15th Streets, during a. m. and p. m. periods of peak traffic flow:

1. Caused undue congestion in inbound and outbound traffic;
2. Slowed traffic down to under 20 mph in a 30-mph zone;
3. Caused delay in transit vehicles maneuvering around parked vehicles to get to bus stops at the curb.

Removal of parking in the direction of major flow had the following effects:

1. Reduced travel time for all traffic 23 percent;
2. Reduced travel time for transit buses over 10 percent;
3. Reduced delays due to stops, idling and starts by 57 percent;
4. Reduced congestion by 33 percent; and
5. Generated an annual saving to rush-hour users of $56,000.

This saving indicates users of the Avenue, during the rush hours only, were paying at the rate of up to 90 cents per vehicle-hour for people to park freely at the curb, in the direction of major flow, throughout the morning and afternoon peak flow periods on Mondays through Fridays.