Accident Reduction Through Channelization Of Complex Intersections

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The primary purpose of an intersection is to interchange traffic in the various cardinal directions. The amount of interchange movements depends primarily on the land-use activity immediately adjacent to the intersection. As intersectional traffic increases and turning movements are generated in larger numbers, it is often necessary to introduce special channelization to control traffic. This may be in connection with a traffic signal, or with other traffic control devices; such as STOP and YIELD signs. In many instances, the increase in the various turning movements at an intersection is accompanied by a similar increase in accidents. Proper channelization has been found to be an effective means of reducing the accident frequency as well as providing the additional capacity for the required intersectional movements. Three examples show how channelization has accomplished these objectives.

DEMPSTER STREET, SKOKIE, ILL.

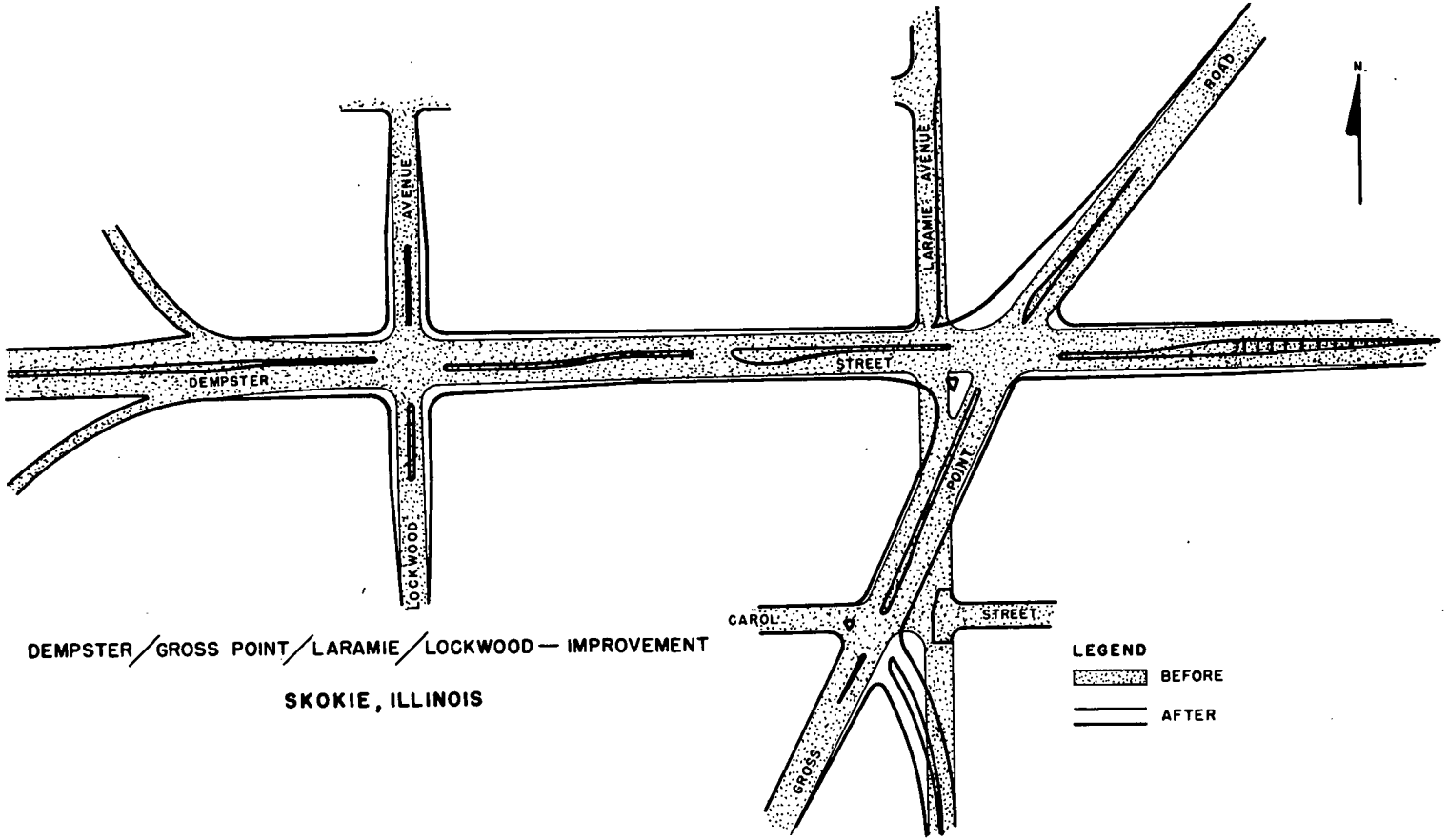
Dempster Street (Fig. 1) in Skokie, Illinois, a residential suburb of Chicago, is an arterial connecting with an interchange of the Edens Expressway west of Lockwood Avenue. Before the improvement, parking was permitted on both sides of Dempster Street, which had a width of 56 ft. Gross Point Road measured 42 ft, and crossed Dempster Street diagonally at a point 50 ft east of Laramie Avenue. Gross Point is also a major traffic route, whereas Laramie is a collector. The intersection of Dempster Street and Lockwood Avenue is located approximately halfway between the Edens Expressway Interchange and the Gross Point Road intersection.

A peak-hour volume count from all six approaches at the intersection of Dempster-Gross Point-Laramie amounted to 3300 vehicles. A three-phase, fully actuated signal was used at this intersection.

During the 2-yr period, 1962 and 1963, there was a total of 197 reported accidents along Dempster Street between the Edens Expressway and LeClaire Street which is on the eastern end of the improvement project. Of these accidents, 143 occurred at the intersections, with 107 involving property damage only and 36 involving personal injury. Fifty-four accidents occurred at mid-block with 46 involving property damage only and eight involving personal injury.

Eastbound travel speeds on this section of Dempster Street averaged 16.5 mph during the a.m. peak and 17.3 mph during the p.m. peak. Westbound speeds averaged 23.4 mph during the a.m. and 18.5 mph during the p.m.

In 1964, a geometric redesign project was undertaken in order to increase travel speeds and to reduce accidents along this stretch of arterial road. Dempster Street was widened to four travel lanes divided by a barrier median between LeClaire Avenue and the Edens Expressway. Parking was removed from both sides of Dempster Street between LeClaire Avenue and the Edens Expressway. Additional left-turn lanes were provided on Dempster Street at three locations: Gross Point Road, Lockwood Avenue, and at a mid-block driveway entrance to a major parking facility serving a bowling alley. Gross Point Road was widened to four lanes divided by a median with additional left or right-turn lanes at the intersection of Dempster. A polyphase controller was installed. Additional improvements included the diverting of Laramie Street into Gross Point Road, south of Dempster, with a traffic signal controlling the point of intersection. North of Dempster, Laramie Avenue was posted southbound, was denied the through and left-turn movement, and was forced into a right turn into westbound Dempster. The intersection of Dempster and Lockwood was widened, channelized with medians, and signalized.



DEMPSTER/GROSS POINT/LARAMIE/LOCKWOOD — IMPROVEMENT

SKOKIE, ILLINOIS

Figure 1.

An accident analysis for 1965 and 1966 indicated a 30 percent reduction in accidents as compared to the rate for 1962 and 1963. The 2-yr total of 197 was reduced to 139 after the improvements were made. Mid-block property damage accidents were reduced significantly from 46 to 25, with all accidents of this type being reduced from 54 to 40. All intersectional accidents were reduced from 143 to 99. The number of accidents involving parked cars was reduced from 25 to 3, and the driveway accidents were reduced from 17 to 4. These reductions are especially significant considering the fact that during the same period of time there was a 26 percent increase in accidents throughout the city.

Another significant improvement was travel speeds on Dempster Street were increased 9 percent during the a. m. peak hours and 20 percent during the p. m. peak hours.

AIRLINE HIGHWAY, METROPOLITAN NEW ORLEANS

In Metropolitan New Orleans, La., US 61 (Airline Highway) is the main connector between New Orleans International Airport and the CBD. This four-lane arterial carries approximately 40,000 veh/day, and one of the major cross intersections (Fig. 2) is David Drive (north) and Hickory Street (south). At this intersection the Airline Highway is divided by a 4-ft median; and Hickory and David are undivided, two-lane, two-way roadways with some minor right-turn channelization at the intersection. Approximately 350 ft west of the David-Hickory intersection, the Airline Highway crosses a drainage canal on a four-lane bridge. The intersection was operating beyond its capacity considering the extremely large number of left turns from Airline Highway into Hickory Street. Hickory is a main feeder into Harahan, a residential subdivision of New Orleans. Traffic was controlled by a semi-actuated, two-phase controller and left turns were permitted to move on the green signal.

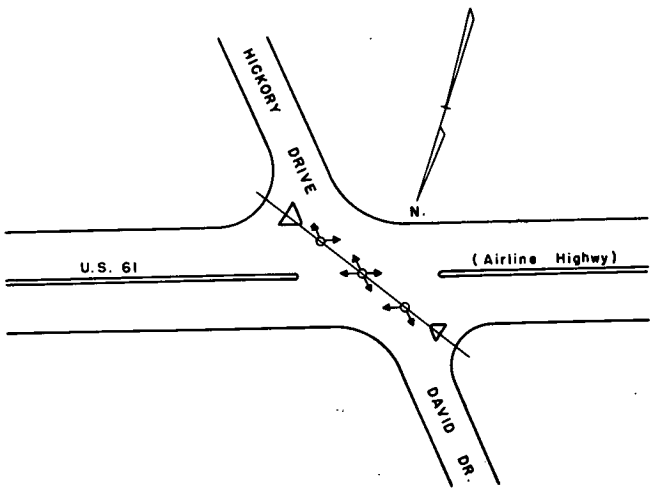
During 1962, there were 64 accidents involving 39 personal injuries and an estimated property damage cost of $21,600. Of the total accidents, 43 were rear-end collisions, 9 involved left-turning vehicles from Airline, 7 were right angles, and the remaining were of the side-swipe and fixed-object type.

In 1963, a major re-channelization was accomplished in order to reduce the accident frequency. The location of the four-lane bridge immediately adjacent to the intersection created a difficult problem in the redesign of this intersection. The approach roadways of Airline Highway were widened and left-turn lanes were provided for each direction. A fully actuated, three-phase signal controller was placed into operation, and additional signal display was provided at the intersection. The total cost of this improvement was $40,000.

An after study showed that a total of 27 accidents occurred one year after the improvement as compared to 64 during the one-year before period. Personal injury accidents were reduced from 39 to 12, and the cost of property damage accidents from $21,600 to $5,900. Thus, total accidents were reduced 58 percent with personal injuries being reduced 69 percent and property damage 73 percent. The types of accidents which occurred in the year following improvement were 15 rear-end collisions, 4 right angles, and the remaining were of various other types. It was concluded that 39 percent of the improvement cost was off-set in the first year of operation due to the reduction of property damage alone without considering the reduction of personal injury.

BARKSDALE HIGHWAY, SHREVEPORT

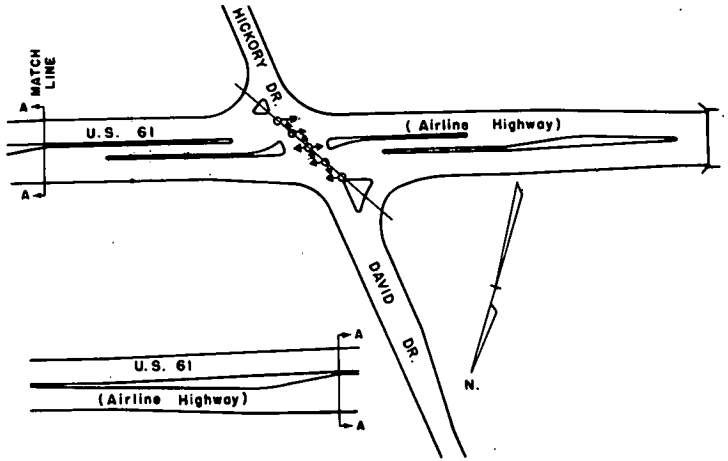
In Shreveport, La., Barksdale Highway is a main connector between that city and Bossier City (Fig. 3). A regional shopping center is located on Barksdale Highway at the intersection of Dee Street in the southwest quadrant. This shopping center is a large generator of traffic and accounts for an appreciable amount of the traffic using the intersection of Barksdale Highway and Dee Street. Of the total 20,200 vehicles using this intersection daily, an appreciable amount would turn left from Barksdale into Dee Street. Barksdale Highway is a four-lane divided highway and before 1964, left turns were permitted from both directions into Dee Street. A separate left-turn lane was provided for the eastbound approach only. There are service roads parallel-



U.S. 61 (Airline Highway) / DAVID DR. / HICKORY DR.

METAIRIE, LOUISIANA

BEFORE

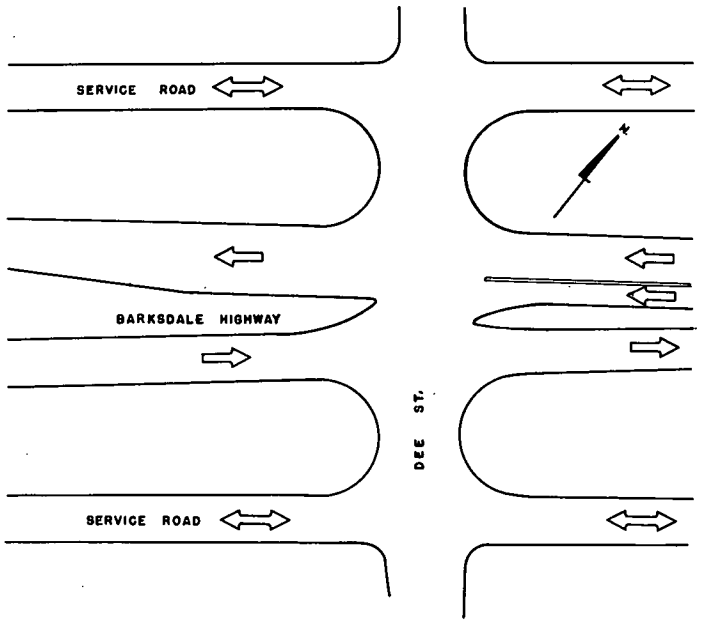


U.S. 61 (Airline Hwy.) / DAVID DR. / HICKORY DR.

METAIRIE, LOUISIANA

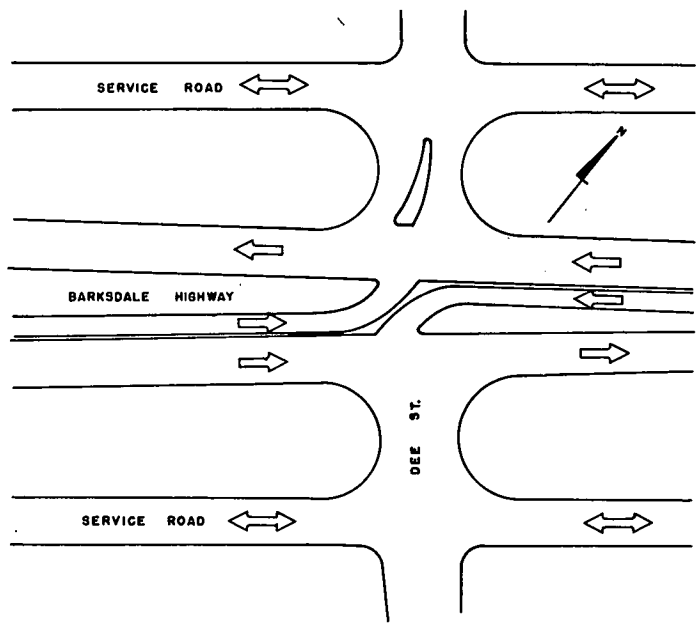
AFTER

Figure 2.



BARKSDALE HIGHWAY AT DEE STREET
SHREVEPORT, LOUISIANA

BEFORE



BARKSDALE HIGHWAY AT DEE STREET
SHREVEPORT, LOUISIANA

AFTER

Figure 3.

ing the main road of Barksdale on each side of the intersection. There is a high-level bridge on Barksdale to the east of this intersection. The north and south service roads connect under this bridge at a point just to the east of the intersection. The closeness of the bridge and the resulting grade on the eastern approach made signalization impracticable at this location. A 26-month analysis showed 18 accidents at the intersection. These involved 16 right angle, one head on, and one side-swipe accident. Of the total accidents, 15 involved personal injury and the cost of property damage for all accidents was $9300.

During 1964, a major redesign was accomplished at the intersection of Barksdale and Dee Street. The main improvement was the closing of the crossover in the center median prohibiting north-south movement on Dee Street across Barksdale. Left-turn lanes were provided for both approaches of Barksdale Highway and islands were provided on Dee Street between the service road and the main roadway of Barksdale. The total cost of the channelization project was $2100. There was not a single reported accident during the 26-month period following the improvement. This 100 percent reduction in accidents resulted in off-setting more than four times the improvement cost considering property damage alone. The reduction in personal injuries further increased this off-set value.

CONCLUSIONS

These three examples indicate the value of simplifying, by means of channelization, traffic movements through an intersection. They are also examples of public funds being expended wisely, with the motoring public reaping the true profit.

Addendum

WASHINGTON, D.C.

Figure 4. Example of a traffic circle underpass, 16th and M Streets, N.W., Washington, D.C.