A Simplified Technique for Transportation Planning

John H. Waggoner, Technical Programs Administration, Texas Department of Highways and Public Transportation, Austin

Simplified techniques for transportation planning developed for several small urbanized areas in Texas are used to point out the need to design procedures that satisfy the requirements of the particular area. This approach has resulted in varying levels of effort for small urban area studies. These range from a comprehensive analysis of existing travel patterns and a manual forecast of travel to an analysis of existing travel patterns and the use of traditional models for forecasting traffic. In the studies described in this paper, primary emphasis is on solving current traffic problems and providing local planners and engineers with the information they want. The procedures are not necessarily cheaper or simpler than traditional ones but were designed to produce a specific product. The importance of developing procedures and techniques that provide useful and meaningful information to decision makers is emphasized.

The comprehensive, continuing, and cooperative (3C) planning process has been used since 1962. The procedures in this process for developing the travel-patterns element reflect the now traditional processes: data collection, trip generation, trip distribution, and traffic assignments, and, for larger areas, modal choice. The products of these processes are forecasts of future traffic volumes.

Should the same procedure be used for an urban area that has a population of 50 000 as is used for one that has 1 000 000 or more? Perhaps there should be a simpler procedure for smaller areas. In Texas, there are 24 urban areas that require 3C planning. These areas vary in population from a little more than 50 000 to almost 3 000 000. In addition to differences in size, the areas vary as to their rates of growth. Several are experiencing little if any growth, but others are growing rapidly. To use the same traditional procedures in all urban areas—large, small, rapid growth, no growth—may produce data that are not used or needed.

If an area is not growing, why spend time and money to predict future traffic? Why not simply count existing traffic? In most smaller areas, even those experiencing considerable growth, new construction consists primarily of extending already existing arterials. Is the traditional type of traffic-assignment procedure necessary for these areas? And perhaps even more important—does the traditional traffic-assignment product provide any real help to local planners and engineers in these smaller areas?

A word of caution, however; the so-called simplified procedures described in this paper are not necessarily easier or cheaper than the traditional processes. Nor do they represent some new breakthrough in the state of the art. Similar work has been going on since traffic signals and traffic counters were invented.

The primary difference between these techniques and the traditional process is the product: The principal product of the traditional process is an assignment of future traffic volumes, but the principal product of these procedures is an accurate description of existing travel patterns.

To obtain these existing travel patterns, time and money are spent in obtaining more and better current traffic data. The purposes for obtaining these data are to identify those areas (usually intersections) where traffic congestion exists and to quantify that congestion. These data, when furnished to local engineers and planners, should form a basis for allowing them to solve current traffic problems today.

In smaller areas, if solutions to current traffic problems can be found and implemented, traffic congestion can be substantially alleviated for several years to come. Periodic reviews can then be made to determine the need for additional studies. Traffic projections are considered secondary, although they still must be made.

The simplified procedures have now been tested in four Texas areas. Three of the study areas have populations of less than 100 000. Although the procedures used for developing the transportation plan have varied slightly, all of them have had the same basic approach. The emphasis was on determining current traffic conditions so that existing congestion could be eased. Traffic forecasts and statistical data indicating growth, trip rates, and such were secondary and treated as such.

The initial tasks for these procedures are the same as those for the traditional study. An existing thoroughfare system is delineated, the zonal structure is determined, and locations for 24-h cumulative-traffic-volume count stations are determined.

The requirements for additional traffic data are determined by the input requirements for traffic engineering computer programs and design data criteria and include

1. Turning movements at major intersections,
2. Manual classification counts at selected points, and
3. Speed and delay studies on major thoroughfares.

The turning-movement counts are made for nine hours at each intersection—7:00-10:00 a.m., 11:00 a.m.-2:00 p.m., and 3:00-6:00 p.m. This ensures that peak traffic periods are monitored. Counts are made for passenger vehicles, including pickup and panel trucks, and for other trucks and cumulated by 30-min periods. Although the needs of the different areas vary somewhat, 100-150 intersections are being monitored in each. These count data are displayed in a report and furnished to traffic engineers in a manner that can be used as input to their models or for manual calculations of signal timings and progressions.

Manual classification counts (usually about 30) are made to provide vehicle-classification data for design purposes and person volumes. The selection of the count locations is made on a basis of functional classification, geographical location, and traffic volume. The counting period is the same as for the turning-movement counts. These counts serve as vehicle-classification control stations. Estimates of truck percentages (by diesel and nondiesel) for both peak and 24-h periods are derived from these counts. Passenger automobiles are counted by number of occupants. These data provide the percentage of automobiles by occupancy rate as well as an overall occupancy.

Speed and delay studies are done by using the "floating-car" method. The product desired from this study is essentially the same as that of other speed studies. However, no attempt is made to produce an isochronal map. These data are reported by using av-

erage travel and delay times and speeds by the routes and segments selected.

Primarily, the routes selected for study are those anticipated to experience at least some delay time. In the report, those segments having what is considered to be excessive delay time are flagged. Because almost all delay appears to be caused by traffic signals, delay times are reported by direction of travel.

Analyses of the data varied from area to area. Prime consideration was given to the specific information the local planners and engineers wanted. For example, the Longview study analysis consisted of expanding the 9-h counts to 24-h traffic and furnishing a 24-h nondirectional turning-movement diagram for each intersection. In addition, the desired 24-h data included total vehicles and person volumes, occupancy rates, total and percentage of trucks, number of diesel and nondiesel trucks, and total approach volume for each leg of the intersection. These data items were also reported for each leg of the intersection for the nondirectional peak-hour volume and percentage of the 24-h period and the directional distribution. The analyses necessary to provide these data were extensive.

For another study area, McAllen-Pharr-Edinburg, most of the local planners and engineers wanted to use traffic engineering simulation programs to determine signal timings. This required a different product from the study.

The McAllen-Pharr-Edinburg study area has a population of 150 000 and is experiencing rapid growth. Because of this rapid growth, traffic congestion in some areas has become acute.

In this study, no attempt was made to expand the turning-movement counts to 24-h volumes. Directional turning-movement counts for all vehicles were prepared for the total 9-h count period and the peak hour in each of the three time periods counted (morning, noon, and afternoon). In addition, turning movements for truck traffic were reported.

In none of these studies was transit a major concern to the local people. In some of the areas, a short-range transit study had been done previously by consultants. The only work done in these studies relative to transit was an inventory of existing public transportation facilities. This was done because there are so many government programs funding such a wide spectrum of functions that collectively can be labeled public transportation and it appeared desirable that local people be made aware of such facilities. These inventories were listed in the report.

A formal report was made for each study. These reports, however, were considered of secondary importance. The technicians who used the data had access to the actual field reports as the work was in progress and, therefore, printing costs were held to the minimum and the number of copies printed restricted.

Some of the most commonly asked questions relative to these studies are about their costs. Such questions are difficult to answer, and it is almost impossible to provide comparative data as salaries paid vary considerably.

The costs for the McAllen-Pharr-Edinburg study totaled about $32 000. In this study, 121 major intersections and 33 manual-count stations were monitored, and 176 km (110 miles) of arterials were surveyed for speed and delay. These costs included about $22 000 for the field work and $10 000 for the analysis and reporting.

Two project supervisors were furnished by the Texas Department of Highways and Public Transportation. The actual counts were made by persons hired locally. The two supervisors spent about eight weeks on the job—two in preparation of the study (i.e., scouting the intersections to be counted, scheduling, and training) and six to collect the data.

These costs do not include those for the 24-h counts made, which were considered to be primarily for use in validating the travel-demand models to be used for forecasting. Nor do they include the preliminary work, which consisted of meetings with local people to discuss the details of, Do we do a study? What procedures will be used? and How will it be funded?

Earlier studies using these procedures employed a manual forecasting technique. Forecasts for short- and long-range target years were made by using some rather simple procedures.

A map of the existing and future thoroughfare systems and a traffic-zone map were the primary tools. The differences between the existing and the target year productions and attractions were calculated and posted on the zone map. These differences and the existing traffic volumes and turning movements then formed the basis for estimating future traffic volumes.

Although these procedures are rather unsophisticated, the final product appears to be as satisfactory as a traffic assignment for use in planning and superior to the assignment for highway design purposes. Satisfactory results for this type of forecast, however, require skilled and experienced personnel.

The procedures outlined in this paper were designed explicitly for particular areas. They have successfully provided the data that were needed at the time they were needed. It should be emphasized, however, that they are not necessarily cheaper or simplified. They were designed to produce a specific product.

It is certainly desirable to design methods that will be faster, cheaper, and more accurate. That is fine. It is also necessary to be certain that the data produced are useful and used.

Application of Manual Techniques for Travel-Demand Estimation

Maurice M. Carter, Comsis Corporation, Wheaton, Maryland

Manual techniques can be valuable in many aspects of transportation planning, especially for small and medium-sized cities. To effectively use these techniques, the planner must be aware of the procedures, assumptions, and, consequently, the utility of the outcome. The use of sensitivity