Table 1. Evaluation of transportation action program.

Community	Year of Evaluation	Number of Improvements Identified	Improvements Completed	
			Number	Percentage
Globe	1974	25	10	40
Payson	1974	18	12	67
Somerton	1975	8	4	50
Wickenburg	1976	18	9	50
Page	1976	25	24	96
Clifton	1977	11	3	27
Holbrook	1977	23	17	74
Nogales	1977	18	13	72
Marana	1978	28	15	54

Note: As of November 1978.

munity and assist this through the services of outside engineers and planners. This produced a community report, developed through local participation, that should result in an action program to enhance traffic flow and safety.

Fifteen such programs have been completed since 1974; it has been found that the effort required of any one individual is minimized because of the broad range of expertise available and, consequently, the time expended can be absorbed in a normal work load. The ADOT planning division acts as coordinator for the program and the traffic operations division provides the engineering expertise. Maps are provided by the community, as are planning data, a tour chairperson, a meeting place, and invitations. In keeping with the community participation concept, the local school system provides a school bus for transportation. ADOT provides the traffic counts, planning and engineering expertise, drafting, analysis, photographs, and a published report illustrated with photographs and maps. There is no cost for this service to the community; the average cost to ADOT is about $3000/study, the maximum to date has been $4000. It should be remembered that the concept is that ADOT should go into the community, identify the problems, recommend a solution, and get out and let the community go to work.

The results in some of the communities that have been visited are summarized in Table 1. In the nine communities, as one would expect, there is a range of activity from do-little to significant improvements.

TRANSPORTATION ACTION PROGRAM BENEFITS

1. Local people realize a direct return on their gasoline tax dollars. One of the first questions asked when the program is discussed with the community is, How much is it going to cost us? There is always a pleased look when people are told that their tax dollars provide the service at no extra cost.
2. A partnership relation is established with the community. The positive feeling of working together is generated. The individuals from the various agencies participating develop first-name contacts with the elected and appointed officials and with the general public. This dispels the we-they antagonisms that sometimes occur when contacts are only through official communications, which give local citizens the feeling that they are being directed by a faceless bureaucracy.
3. The perception of reality (e.g., limited funds, statutory restraints, constitutional requirements such as the highway trust fund monies, and the numerous regulations) is brought into focus at the local level.
4. A published document is provided to focus attention and to keep in the forefront the list of things that should be done. This not only aids the community but also enhances ADOT's credibility, especially when its responsibilities, as outlined in the report, are accomplished.

Abridgment

An Explanation of Why Synthetic Transportation Studies Work

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Various validation studies have shown that synthetic urban-transportation-study techniques can achieve acceptable results when compared with conventional traffic assignments and ground counts. Does this favorable comparison indicate that the trip matrix developed by synthetic procedures reflects actual travel patterns? How sensitive is the assignment to the input data? A sensitivity analysis that used data from the Tyler, Texas, urban transportation study was performed to help answer these questions. Four matrices were assigned to the same network and compared:

1. Assignment 1 matrix—a stochastic trip matrix constrained only to the total number of trips in the study area,
2. Assignment 2 matrix—a stochastic trip matrix constrained to total trips and trip-length frequency,
3. Assignment 3 matrix—a stochastic trip matrix constrained to total trips, trip-length frequency, and trip ends at each external station, and
4. Existing trip matrix—the fully modeled trip matrix.

Analysis of the results from the assignments indicates that, as long as an accurate trip-length frequency is used in generating the trip matrix, the assigned vehicle kilometers of travel will very closely match the counted vehicle kilometers of travel, even when the distribution of zonal trip ends is unrealistic.

As in all urban transportation studies, the Tyler zonal structure reflects the geographical distribution of activities in the urban area. This can be illustrated by subdividing the area into four concentric rings: Ring 1 consists of the central business district (CBD), rings 2 and 3 consist of the remainder of the developed urban area, and ring 4 consists of those zones in the fringe

Table 1. Geographical distribution of internal zones and trip ends.

Item	Ring			
	1: CBD	2: Developed Urban	3: Developed Urban	4: Fringe Area
Number of zones	34	28	88	51
Approximate area (km^2)	0.65	6.5	58.8	84.4
Average number of zones per square kilometer	52	4.3	1.5	0.6
Number of trip ends per square kilometer				
Desired[a]	53 000	11 200	3860	770
Resulting from assignment 1 matrix	115 000	9300	2700	1200
Resulting from assignments 2 and 3 matrices	151 000	12 400	2700	770

Note: 1 km^2 = 0.386 $mile^2$.
[a]Computed by using existing-trip matrix.

area. As is shown in Table 1, the intensity of activities is reflected by decreases in the number of desired trip ends per unit area and in the number of zones per unit area.

In the case of the assignment 1 matrix, the expected percentage of trip ends per ring equals the percentage of the zones within that ring.

Addition of the trip-length-frequency constraint (the assignment 2 matrix) increases the number of trip ends in rings 1 and 2 (i.e., the CBD and the inner portion of a developed urban area). This simply reflects the large number of opportunities to travel at the shorter separations (i.e., 1-5 min) within rings 1 and 2, which results from the smaller zone sizes in these rings. In essence, the zonal structure provides a crude tool for a distribution of activities in the urban area.

Previous research, based on a 100 percent home-interview survey of three selected zones (1), has shown that estimates of zonal trip ends, based on the expansion of home-interview data from that zone, are subject to substantial error. For example, the observed expected error ranges at the 95 percent probability level varied from ±32 to ±66 percent, when a 5 percent sampling rate was used for a zone containing 424 occupied dwelling units. Other research (2), using the same data base, has shown that estimates of interchange volumes from expanded survey data are subject to even greater variance than are zonal trip ends.

The fact that these origin-destination trip tables have produced reasonable assignment results has led practitioners to feel confident in the accuracy of their survey. Thus, because of the aggregative nature of the assignment procedure, much of the precision in modeling phases such as trip generation and trip distribution can be sacrificed, and the model will still produce reasonably accurate assignment results (3). Therefore, abbreviated or synthetic techniques can produce assignment results of sufficient accuracy for valid evaluation and comparison of system alternatives. Acceptable assignment results can be expected if the following conditions are satisfied:

1. The correct mean trip length is used,
2. The total number of trips in the study area is correct, and
3. A reasonable approximation of the geographical distribution of trip ends is achieved.

REFERENCES

1. V. G. Stover, J. D. Benson, and L. J. Ringer. Accuracy of Trip End Estimates from the Home Interview Survey. Texas Transportation Institute, Texas A&M Univ., College Station, Res. Rept. 167-7, Aug. 1973.
2. V. G. Stover, J. D. Benson, and D. F. Pearson. Accuracy of Travel Pattern Estimates from the Home Interview Survey. Texas Transportation Institute, Texas A&M Univ., College Station, Res. Rept. 167-8, March 1974.
3. J. Buechler, V. G. Stover, and J. D. Benson. A Sensitivity Evaluation of Traffic Assignment. Texas Transportation Institute, Texas A&M Univ., College Station, Res. Rept. 17-2, Nov. 1974.

The use of the synthetic travel-estimation technique described by Stover has been found to be technically valid. The workshop participants observed that it has been used successfully in many states (such as Texas, North Carolina, Georgia, Kentucky, and Florida). It was noted, however, that this procedure should be used only in areas where anticipated rapid growth will result in the need to evaluate significant changes in the existing transportation system.

It was generally agreed that too much time can be given to calibrating travel-demand models. Traffic-assignment procedures are overpowering relative to trip-generation and trip-distribution procedures and can mask errors in these earlier steps. Thus, reasonable trip-generation and trip-distribution results should be adequate; it is not necessary to achieve high levels of accuracy in the calibration and validation analysis.

The workshop participants concluded that the effective use of synthetic techniques requires an analyst who has a high degree of expertise. Considerable effort may be wasted in attempting to obtain meaningful results if the analyst is not sufficiently skillful. Other factors that should be investigated before deciding to use the procedure include the availability of socioeconomic data, access to operational computer programs, and the availability of necessary travel models.

Although Stover's paper addressed the use of the synthetic technique for estimating internal travel only, several workshop participants reported the successful use of synthetic procedures for estimating external travel. This has been done in Kentucky, North Carolina, Florida, and Texas. Because of the high cost of external surveys relative to other planning activities in small and medium-sized communities, the workshop participants recommended that an attempt be made to synthesize external travel before conducting a survey. They also recommended that the synthetic procedure not be used to develop information on turning movements.