Abridgment

Dwelling-Unit to Parking-Stall Trip-Generation Analysis

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This report briefly summarizes a simplified method for relating zonal dwelling-unit (DU) and zonal parking-stall (Pk-stall) data to trip generation. This DU-Pk-stall method has been used successfully by the Kansas Department of Transportation (KDOT) in studies in El Dorado, Dodge City, and Arkansas City. The results have proved surprisingly accurate in simulating existing conditions in small cities in Kansas and have required a minimum amount of time and money for data collection and tabulation.

The information required for this method of internal trip generation is a DU survey and a Pk-stall survey. The DU information (DUs per zone) is summarized by using census information and used to determine internal trip productions. The Pk-stall survey is taken in the base year for parking lots and on- and off-street parking locations and shows the number of parking stalls per zone, the turnover, and the percentage occupancy. The location information is gathered by driving around the city and counting the number of parking stalls in each internal zone. The number of turnovers is determined by consulting the commercial parking lot owners and manufacturing personnel or by conferring with a knowledgeable local resident. This information is used to determine internal trip attractions. The three internal trip purposes used are (a) DU to DU, (b) Pk stall to Pk stall, and (c) DU to Pk stall. To determine the productions (Ps) for each internal zone, the DUs for each zone are multiplied by factors representing trips per DU. The number of trips per DU assigned for a particular zone depends on where the zone is located within the study area. In the network-calibration phase, these factors can be adjusted as necessary. The Ps per zone are summed to give the total number of Ps in the study area. This total number of internal Ps is later used as a control total in a factoring process to determine the number of attractions (A's) per zone.

The number of A's per zone is determined from the Pk-stall information. Basically, the number of Pk stalls is multiplied by their corresponding daily turnover rates to determine their daily Pk-stall A's. These Pk-stall A's are tabulated on a zonal basis to determine the number of A's per zone. The A's per zone are then summed to give the total number of A's in the study area. The total number of A's in the study area is not equal to the total number of Ps. The number of A's per zone is factored by using the ratio of total Ps to total A's so that the total number of A's equals the total number of Ps. Thus, at this point, the number of Ps and A's for each zone has been determined, and the total number of Ps equals the total number of A's.

The next step in the trip-generation process is to split the Ps and the A's by purpose. Three trip purposes are used (Du to Pk stall, DU to DU, and Pk stall to Pk stall) at a 60-20-20 split. (This split has given satisfactory results in similar studies by KDOT.) The end results at this point are the numbers of Ps and of A's for each zone and for each trip purpose.

This result can be verified by comparison with the results obtained by using Equation 1, which was developed during a similar study in St. Cloud, Minnesota (1).

$$\text{Total internal trips} = 10\,062 + 2.4 \times \text{population of city} \quad (1)$$

The resulting zonal Ps and A's are then used in the standard trip-distribution phase of the study.

REFERENCE

1. Bather, Ringrose, Wolsfeld, Inc. Development of Internal Travel. St. Cloud [MN] Metropolitan Area Transportation and Planning Study, Tech. Memorandum, Aug. 1971, p. 26.

Abridgment

Simplified Procedure for Estimating Future Trip Generation

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This procedure (which assumes that existing socioeconomic data are already completed) involves the following steps:

1. Develop the control total for the number of trip productions (Ps) and attractions (A's) by purpose.
2. Add new developments (by zone) that are known to be coming (e.g., plats and such already approved or submitted).
3. Divide the study area into two sections: (a) area already developed and (b) undeveloped area.
4. For areas already developed, (a) confer with local planners, and determine growth potential (land-use density changes) for each zone (this can be done by sections

or sectors assuming all zones within an area to have uniform changes), (b) adjust this by using appropriate factors (up 10-50 percent or down by a factor of 0.9 to 0.7), and (c) apply these factors directly to the existing Ps and A's (by purpose).

5. For areas outside the developed area, flag zones that will be developed by target year by percentage developed (e.g., 0, 25, 50, 75, 100 percent developed).
6. Apply average trip rate (by purpose) per developed unit area.
7. Sum the total Ps and A's, compare with the control total, and adjust as necessary.
8. Continue the distribution.

The procedure makes the following assumptions:

1. Newly developed areas will be similar in characteristics to the typical existing developed areas.
2. The error in trip rates is probably less than that introduced by a zone-by-zone 20-year forecast.

Abridgment

Procedure for Analysis of System Sufficiency and Deficiency

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This procedure was developed for use in the Portland, Maine, area comprehensive transportation study. It was designed to develop a statement of the sufficiency of the existing roadway system with respect to operating, physical, and safety aspects. Roadway elements evaluated include intersections, links, bridges, rail grade crossings, and high-hazard locations.

The statement of existing conditions identifies needs that are the basis for a remedial-action analysis that leads to the development of an improvement-implementation program.

A two-stage screening analysis is used. The first-level screening is based on broad performance criteria and separates roadway elements into two groups—those obviously adequate and those requiring closer study. The second level, which uses a limited number of specific analytical and quasi-subjective tests, serves two purposes; it further screens out elements that are adequate, and it identifies and quantifies the deficiencies of those elements found to be inadequate. (Locations for which planned actions have been developed in previous studies are not included in the screening analysis.)

The screening measures used for the various roadway elements are as follows:

1. Intersections: volume-to-capacity ratio, delays, number of accidents, and physical condition (lane width, sight distance, condition of traffic-control devices, and alignment and geometrics);
2. Roadway segments (links): volume-to-capacity ratio, midblock delays, average speed, number of accidents, signing, striping, condition of control devices, and physical conditions (width, drainage, wearing surface, structural, and shoulders); and
3. Spot locations (bridges, at-grade rail crossings, and curves): legal load capacity, vertical clearance (for through spans and under bridges), roadway width in relation to pavement width (on approach roadways), bridge-deck wearing surface, structural integrity, number of accidents, volume-to-capacity ratio on bridge compared with volume-to-capacity ratio on approach roadways, lateral clearance, drainage, vehicle delays at crossings, and road conditions.

Session Summary

The workshop participants identified 10 recommendations relating to system planning policy and application for small and medium-sized communities.

1. The planning process should be a grass-roots activity that addresses the transportation issues and problems as identified by local officials and implementing agencies. Thus, the identification of the problems should be a critical initial step in the planning process.
2. Flexibility in transportation planning should be encouraged. Appropriate and effective planning will vary from area to area in terms of both time frame and methodology. The traditional 5- and 10-year cycles for plan reappraisal and revision are not appropriate.
3. The procedures and techniques used in a technical analysis should reflect the complexity of the problem. Every effort should be made to use the simplest procedure or technique applicable. The time required to provide meaningful information to the decision maker should be considered in selecting the appropriate procedure or technique.
4. In small communities experiencing little or no growth, traffic engineering studies are all that is necessary.