reduce traffic and manage other growth impacts have proven inadequate to the problem.

- Development of strategies for coordinating local planning with regional and state planning; exploration of alternative institutional arrangements and assignments of responsibility, reflective of emerging financing and decision-making realities.

- Assessment of mandates now in effect in some states for state/regional/local land use and transportation plan coordination and consistency.

- Assessment of the performance of transportation management organizations (TMOs) and other private-sector or public-private organizations for transportation planning and service provision.

Approaches such as these seem likely to be the focus of considerable activity in the next few years, as urban areas struggle to cope with congestion and to manage development (whether promoting it in areas in need of growth, or controlling it in high-growth areas.) Better information on the options would be helpful, as would creative thinking on other approaches that might be taken.

CONCLUDING COMMENTS

Transportation and land development have long been topics of interest to researchers as well as practitioners. Today, changes in technology, finance, and public policy are converging to change practice and challenge theory. The field thus is ripe for renewed efforts in research, experimentation, monitoring, and evaluation. For these activities to be fully productive, communication of findings among the various actors will be critical.

TRAVEL CHARACTERISTICS AT LARGE-SCALE SUBURBAN ACTIVITY CENTERS: STATUS OF CURRENT RESEARCH

by
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RESEARCH PROBLEM STATEMENT

Suburban Activity Centers (SAC) are one of the fastest growing segments of our urban areas. However, there is very little up-to-date information on travel characteristics of these activity centers, particularly the large-scale, multi-use suburban centers that have been developed recently. For that reason, NCHRP Project 3-38(2) was initiated to collect and analyze travel characteristics data appropriate for use in evaluating the site impact of individual buildings, the regional traffic impact of individual buildings, the regional traffic impact of SAC's, and the internal trip characteristics of SACs. The following is a brief summary of the research approach and of the key findings. The complete document

is being published as NCHRP Report 323.

PROJECT OBJECTIVE

The primary objective of this project was to develop and analyze a comprehensive database on travel characteristics for various types of large-scale, multi-use suburban activity centers. The travel characteristics which were collected by means of intercept and mail back surveys included the trip generation rates, trip length and origin/destination, trip purpose, trip mode, and trip linking. Travel characteristics data were collected at six large-scale suburban activity centers:

- Bellevue - located 10 miles east of the Seattle CBD
- South Coast Metro - located in Orange County 45 miles south of the Los Angeles, California CBD
- Parkway Center - located 10 miles north of the Dallas CBD
- Perimeter Center - located 12 miles north of the Atlanta CBD
- Tysons Corner - located 12 miles west of the Washington, D.C. CBD
- Southdale - located 10 miles south of the Minneapolis CBD

The following list provides a description of their size in terms of the magnitude and mix of office and retail space.

SAC	OFFICE SPACE	RETAIL SPACE
Bellevue	4.7 million GSF	3 million GLA
South Coast Metro	3.5	4
Parkway Center	17	7
Perimeter Center	13	2
Tysons Corner	13	3
Southdale	4	3

Bellevue, South Coast Metro, and Southdale are all roughly the same size and have a relatively even split of office and retail space. These three SAC's are termed "small" SAC's in the subsequent descriptions. Perimeter Center and Tysons Corner are much larger and dominated by office space. Parkway Center is even larger and, with its three regional malls, has by far the greatest amount of retail space of the SAC's surveyed. These latter three SAC's are referred in subsequent text as the "large" SAC's.

Data were collected at a total of 87 office buildings (16 of which are larger than 300,000 gross square feet), at 24 retail sites (including seven regional malls), at 15 hotels, at 18 residential complexes.

OFFICE ANALYSIS

Trip Generation: The measured vehicle trip generation rates at the surveyed office buildings are lower, on a building square footage basis, than the ITE Trip Generation Report rates. However, on a per building employee basis, the measured trip generation rates tend to be higher than the ITE rates.

These relationships hold true for large complexes as well as for small office buildings. The relationships also hold whether the office building is located in a sprawling SAC like Parkway Center or a dense SAC like Bellevue.

WORK TRIP MODE SHARES

The Bellevue SAC has extensive, radial bus transit service and roughly seven percent of the office employees use transit for their commute trip. In contrast, the other five SAC's have limited transit service and none have a work trip transit mode share as high as one percent.

These low transit mode shares are not only a function of the limited transit service to the SAC. Most SAC employees make midday trips or make intermediate steps on their way to or from work and they prefer to make these trips by auto. These trips are primarily for a meal or shopping for a work-related purpose.

The mode of midday trips is predominantly by automobile. The dense development pattern and continuous pedestrian facilities in Bellevue results in one-fourth of the midday tips being made by foot. However at the other five SAC's the midday walk mode share averages six percent.

RETAIL ANALYSIS

Trip Generation: Trip generation counts were taken and intercept surveys conducted at 26 retail sites including seven regional malls. The majority of the surveyed regional malls have lower trip generation rates than estimated using ITE data.

TRIP ORIGINS AND DESTINATIONS

A substantial proportion of the trips to and from the regional malls are internal to the SAC. In the large SAC's like Parkway Center, Perimeter Center, and Tysons Corner, nearly half of the midday trips and one-third of the evening peak period trips are internal to the SAC. In the smaller SAC's such as Bellevue, South Coast Metro, and Southdale these internal proportions decrease (one-fourth of the midday trips and one-seventh of the evening peak trips).

For SAC's with more than one regional mall, there is measurable interaction between the malls. During the midday, roughly two percent of a mall's trips are linked to the other mall. During the evening peak period, the interaction between malls falls between two and three percent.

RESIDENTIAL ANALYSIS

A total of 19 multi-family residential complexes were surveyed. An average of 1.6 residents and 1.5 autos were found at the surveyed sites.
Of all the SAC residents which are employed, 30 percent reported their work site to be located within the SAC. For residential complexes in the larger SAC's (e.g., Parkway Center, Tysons Corner), the internal work proportion increases to 33 percent. In the smaller SAC's the proportion decreases to 27 percent.

The impact of this relatively high intra-SAC employment for SAC residents on overall SAC travel patterns is minimal, for two reasons. First, the number of dwelling units (and therefore the number of potential employees) is relatively small compared to the total number of jobs in the SAC. For example, the Tysons Corner SAC has roughly 2,000 dwelling units. Even if one person at each household is employed in the SAC, that adds up to only one employed SAC resident for every 20 SAC jobs. The second factor is that not all dwelling units have an employed resident. Many SAC residential developments attract senior citizens even if they are not exclusively elderly complexes. For example, the high-rise Rotunda complex located in Tysons Corner has a total of 1,200 dwelling units but only 60 percent of the units house an employed resident.

The dominant mode of trips internal to the SAC made by SAC residents is the automobile. In dense activity centers like Bellevue and South Coast Metro, roughly one-sixth of these trips are made as pedestrians. In the sprawling activity centers, the walk proportion drops to only three percent of the total internal trips made by SAC residents.

HOTEL ANALYSIS

A total of 15 hotels were surveyed. The hotels ranged in size from a 160-room business hotel to a 575-room hotel with extensive conference/meeting facilities. The majority of the surveyed hotels have lower peak hour trip generation rates than reported by ITE.

There is a great deal of interaction between the SAC hotels and the remainder of the SAC. For hotels located within the large SAC's (Parkway Center, Perimeter Center, and Tysons Corner) over one-third of the morning and evening peak period trips entering or exiting the hotel are internal to the SAC. For hotels located within the small SAC's (Bellevue, South Coast Metro, and Southdale) the intra-SAC proportions drop to 19 percent in the AM and 27 percent in the PM peak periods.

IMPLICATIONS OF RESEARCH RESULTS

NCHRP Project 3-38 (2) has produced a tremendous amount of useful information on travel characteristics at large-scale suburban activity centers. It is impractical to identify a specific list of the key findings because each data element could have direct relevance to a particular practical application.

The reader is encouraged to obtain the complete report and to become familiar with the scope of the entire research effort in order to understand both the applicability of and limitations the reported travel characteristics data.

Based on the research results presented in the complete report, it is clear that there is a great deal of interaction between buildings located within large-scale suburban activity centers. However despite this high level of interaction, traffic congestion within the SAC and on its access routes is perceived to be a significant problem by virtually all tenants of the SAC (employers, workers, shoppers, visitors, and residents). A key factor in this perceived congestion problem is the dominating reliance in the SAC on the private automobile. In order to address this problem, the following actions are recommended:

- Directly serve the SAC with radial bus transit service. Focus this service on a centralized transit center. Although the practical limit may only be a transit mode share of six percent overall, this mode share nevertheless represents a significant number of employees in the large-scale SAC's. With a six percent transit mode share, traffic congestion would be noticeably reduced in the majority of SAC's in which current transit patronage is nil.

- Connect building sites with pathways whether they are pedestrian overpasses or underpasses across major highways or just simply sidewalks or striped pathways in parking lots. In order to minimize the reliance on the automobile for the midday trip by office employees, it will be necessary to provide continuous and direct pedestrian system.

- Provide more mixed-use centers like the Galleria in Parkway Center. These centers generate a tremendous amount of intra-site trips which both serve the needs of the employees/shoppers and do not add to traffic volumes in the SAC.

PLANNING SOLUTIONS -- TDM AND BEYOND

by

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INTRODUCTION

Can we successfully utilize transportation planning to resolve and avoid suburban traffic congestion?

This question is addressed here in two parts. The first part is a probe into the efficacy of planning solutions, most specifically Travel Demand Management (TDM). The material started life as a presentation at the 1988 TRB Annual