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Playing the Numbers Game

When it comes to TODs, trip-generation figures can make all the difference.

By Adam Millard-Ball and Patrick Siegman

Traffic studies are an ingrained part of the planning process. In most U.S. communities, all but the smallest developments are required to forecast their impact on the roadway system and evaluate the need for new infrastructure.

The methodology has long been seen as a routine process, undertaken by traffic engineers based on Institute of Transportation Engineers manuals. Increasingly, however, planners are realizing that conventional traffic impact analysis creates serious hurdles for compact, transit-oriented development.

The problem is simple: Traffic study methodologies are designed to analyze single-use, auto-oriented suburban development proposals. Although thousands of pedestrian- and transit-friendly traditional neighborhoods exist — indeed, this was the predominant pattern of development before World War II — the most commonly used manuals contain virtually no data on them.

In fact, the recommended procedures for preparing a trip-generation report declare that such places are not proper candidates for study.

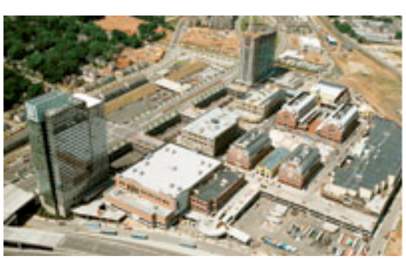
ITE's *Trip Generation* is the customary reference for figuring the number of vehicle trips likely to be produced by a given amount of development. The manual draws on more than 4,250 empirical studies and includes information on 150 different land uses. However, as the companion *Trip Generation Handbook* reports, "The data contained in *Trip Generation* are, by definition, from single-use developments where virtually all access is by private automobile and all parking is accommodated on site."

Why is this true by definition? ITE's recommended site-selection procedures for a trip-generation study declare that it should be possible to isolate the site for counting purposes. Therefore, selected sites must have "no shared parking (unless the parking areas for the site are easily distinguishable); no shared driveways (unless the driveways for the site are easily distinguishable); limited ability for pedestrians to walk into the site from nearby parcels; [and] limited transit availability or use (unless transit usage can be counted — e.g., elementary students who ride a school bus)."

These procedures rule out counting the traditional mixed use neighborhood, which, for ITE, has too much shared on-street parking, too much walking from place to place, and often too much transit.

As a result, although millions of Americans live, work, and shop in traditional streetcar suburbs, mixed use neighborhoods, and downtowns, *Trip Generation's* 1,822 pages offer no insight into their travel habits.

Skewed estimate



For new developments with characteristics that reduce automobile use — located close to transit, containing a mix of uses, or charging for parking — the use of unadjusted average ITE trip-generation rates will in many cases drastically overestimate the amount of traffic generated. A corner store with no parking across from a subway station in a dense, transit-oriented development is often forecast to have the same impact as a 7-Eleven on a suburban highway.

"Conventional traffic analysis methods are not always as sensitive as they could be to new urbanist, TOD, and similar types of development," says Jerry Walters, a California-based principal at Fehr & Peers Associates. In turn, this leads to a tendency to "oversize the transportation infrastructure," he says.

"The traffic engineering profession is just waking up to the fact that one can overbuild infrastructure so it no longer serves the community," continues Walters. "When one tries to design facilities to cater to the maximum demand that may occur, one can end up with too much.

"It's true of parking," Walters says. "It's also true of streets," where oversizing can lead to more lanes, wider lanes, and longer signal phases than are strictly warranted. This not only adds to development costs but reduces the amount of space available for trees and other amenities, and creates physical barriers in the community.

Peter Swift, a Colorado-based traffic engineer, goes further, arguing that traffic studies distort priorities by giving undue weight to accommodating the automobile. "Transportation is driving land use," he says. "It should be the other way around."

Swift calls instead for a "bottom-up approach" that sets a high priority on creating walkable communities. Thoroughfares should never be more than four lanes and should be part of a highly connected network of streets, he says, pointing out that these streets can handle 30,000 to 34,000 vehicles per day in an urban context. "It's a huge amount of traffic."

Part of the problem is that traffic engineers have focused on the dangers of underestimating traffic generation and discounted the risk of overestimation, Swift says. "In each of the processes within a traffic study [trip generation, lane assembly, and cross-section design], factors of safety are built in to accommodate traffic that will never appear," he says.

The result of this conservative approach? Cities end up with more traffic lanes than are needed, which in turn induces more traffic. "We've got a self-fulfilling prophecy," says Swift.

A disconnect

Many of the tools needed to change this situation are already available to public agencies. ITE has long advised engineers to take account of alternatives to the private automobile and modify trip-generation rates accordingly.

So what's the problem? It's threefold:

• A widespread lack of knowledge about the significant body of research findings on factors that influence trip generation.

• A shortage of simple procedures or models to help engineers and planners apply these research findings to garden-variety traffic impact studies.

• A reluctance on the part of municipalities to accept new standards.

Swift points out that appendices to ITE's *Trip Generation Handbook* show that mixed use development in places like Mizner Park in Boca Raton, Florida, generates 28 to 41 percent less traffic than the standard trip-generation rates. "It's huge," he says. "It means that we don't have to build these high-speed thoroughfares." However, officials "almost across the board" refuse to allow this level of reduction, he says.

The figures are even better in transit-rich areas where parking is not subsidized. In downtown San Francisco, the number of employees doubled (from 250,000 to 500,000) between 1968 and 1984, while the number of cars traveling into the downtown stayed the same, according to the San Francisco Planning Department. The reasons: completion of the subway system and downtown zoning that severely limited parking.

According to Donald Shoup, FAICP, professor of urban planning at the University of California–Los Angeles, downtown San Francisco has just 0.14 parking spaces per job, a constraint that ensures that the city's trip-generation rate will be a tiny fraction of the average rates reported in *Trip Generation*.

More data will soon be available from a National Cooperative Highway Research Program study on internal capture rates from mixed use development. The study is expected to be completed by the end of the year.

Open-minded cities

Established urban centers tend to be most open to alternative trip-generation methodologies. In Seattle, for example, most studies apply a mode split factor to take account of trips made by transit, walking, and cycling.

In other places such as Atlanta, Georgia, and Santa Clara County, California, agencies grant a flat percentage reduction for various trip-reduction features of a development proposal. Most commonly, this is for mixed use projects, according to Texas Transportation Institute director Brian Bochner, who is leading the NCHRP study of trip generation for mixed use developments. Agencies in areas with rail transit systems are most likely to grant this reduction, he says.

As part of its review process for developments of regional impact, the Atlanta Regional Commission allows developers to claim a five percent reduction in vehicle trips for projects within a half-mile of a rail station and three percent for those within a quarter-mile of a bus stop. Credits are also available for higher densities, mix of uses, parking management, shuttle provision, and bicycle and pedestrian facilities.

Jerry Walters points to Atlanta's Atlantic Station development as a good example of how to incorporate the latest research on trip generation, taking into account the benefits of parking costs, transit accessibility, and the pedestrian environment. "Atlantic Station generates less impact on the site than a more suburban pattern of development," he says.

Shifting emphasis

One way to deal with the inherent uncertainty of traffic analysis is to place less emphasis on traffic forecasts and to focus instead on achieving a specific trip reduction as a policy goal. This approach is most common in established cities and in fast-growing suburban communities that are aggressively promoting transit-oriented development.

An example is Montgomery County, Maryland, part of the Washington, D.C., metro area. In the late 1980s, developers of the Silver Spring Metro Center were required to agree to stringent mode choice objectives as a condition of development approval. They had to guarantee a 30 percent transit mode share and a carpooling rate of 1.3 persons per vehicle. The alternative was to ensure that auto drivers would make up no more than 50 percent of employees arriving or departing at peak times.

Nearby Fairfax County, Virginia, adopted trip-reduction targets in December 2004 as a condition of a comprehensive plan amendment to allow dense, transit-oriented development adjacent to the Vienna Metrorail station. For office uses, the county mandates a 25 percent reduction in peak-hour vehicle trips; for residential, the target is 47 percent.

County planners listed market-rate parking charges for single-occupant vehicles, parking costs separated from rents, retail shops, a bike station, and one-on-one advice about transportation options as some of the ways developers could meet the targets. But the county is not relying on the developer's projected trip-reduction projections alone.

The transportation demand management program "will be evaluated initially in at least three stages during the development process; first at the time of rezoning, second before and during construction, and third after project completion or ‘build out,'" says the board of supervisors motion to amend the comprehensive plan to allow the development.

In the NASA Research Park at Moffett Field in California's Silicon Valley, the adopted TDM plan calls for reducing peak-hour trips to 40 percent below what would be expected in this suburban location. The TDM requirements are included in leases; if trip reduction targets are not met, tenants are required to pay penalties, which will fund additional TDM measures.

Seattle's transportation management plan process, adopted in 1994, uses the city's traffic study as a baseline — which developers are required to improve on. The TMP identifies targets for reducing traffic below the baseline and outlines the demand management measures to achieve this goal.

"The TMP has enabled us to continue to allow growth and development where we've wanted it, without a significant increase in congestion," says John Shaw, the city's senior transportation planner. "It gives developers a maximum single-occupancy vehicle percentage and identifies those elements that will help them meet that target."

Targets take into account transit accessibility and other opportunities to reduce trips. "There's no value if we impose a condition that can't be met," Shaw says. "A typical reduction is in the range of 20 to 30 percent from the traffic study baseline." If a development fails to meet the target, the city may require additional trip-reduction measures.

Shaw sees the TMP process — identifying trip-reduction goals, necessary measures, and reporting requirements — as applicable anywhere, even in suburban areas with little or no transit. "The programmatic elements of the TMP can work anywhere," he says. "Obviously, the percentage reductions will vary depending on what alternative modes are available."

What can planners do?

Given that traffic impact analysis is typically the preserve of traffic engineers, how can planners help to ensure that the process does not disadvantage transit-oriented development?

Brian Bochner suggests that planners should be advocating for more funding to expand the ITE trip-generation database. "The desire is there to do more sophisticated analysis, but the data are very expensive to collect," he says.

Susan Handy, who teaches in the Department of Environmental Science and Policy at the University of California at Davis, sees the need for more academic research on the links between neighborhood design and travel behavior. And both planners and engineers need to be encouraged to make use of the extensive literature that already exists. As it is now, she adds, both groups are reluctant to deviate from established methodology, no matter how flawed and limited it is.

For Peter Swift, the solution is nothing short of a paradigm shift, brought about by a new generation of transportation planners. "It's absolutely mandatory that planners get involved in this dialog," which has been dominated by engineers, he says.

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For Closer Calculations

A useful tool for quantifying trip-reduction benefits is the recently upgraded URBEMIS (urban emissions) model, which was developed by the California Air Resources Board to calculate the air quality impacts of new development. A new version, released this year, includes a mitigation component that makes it possible to calculate the impacts of a range of trip-reduction measures.

The model, which is based on trip-generation rates published by the Institute for Traffic Engineers, takes into account not just the physical characteristics and location of a development but also the impact of demand management programs such as telecommuting and parking charges. It makes it possible to fairly evaluate developments that minimize transportation impacts by, for example, locating close to transit or providing high densities and a mix of uses.

The model is available at www.aqmd.gov/ceqa/urbemis.html. For more background on the new operational mitigation component, see www.nelsonnygaard.com.

Resources

Images: Top — Atlantic Station shows what can be done to lower trip-generation rates. The Atlanta development, built on the site of a shuttered steel mill, offers accessibility to public transit, a pedestrian environment, and a mix of uses and housing types. Middle — Aerial view of the retail and entertainment district. Bottom — The Art Foundry Commons Park at Atlantic Station. the 138-acre community includes 11 acres of public parkland. Photos courtesy of Atlantic Station.

Reading. The seventh edition of *Trip Generation*, and the *Trip Generation Handbook*, both published by the Institute of Transportation Engineers, are available from APA's Planners Book Service (www.planning.org/bookservice).