

Urban and Person Trip Generation

Prepared by ITE Urban and Person Trip Generation Panel

The Issue

The trip generation data presented in the nine editions of *Trip Generation Manual* published by ITE over the past 40 years has focused on vehicle trips at land uses in suburban settings. It provides limited understanding of urban trip generation characteristics and current trends in transit-oriented, multi-use and mixed-use, active transportation, shared mobility and more compact land uses. A better understanding of urban and person trip generation is desired, particularly where travel by modes other than personal vehicles may be significant.

The application of suburban data in urban settings can overestimate motor vehicle demand. The result has been past decisions where:

- modes such as bicycle, pedestrian, transit, and rideshare (carpooling and shared mobility) may have been largely ignored, resulting in inadequate support or capital
- mitigation of vehicle impacts may have exceeded needs
- potential imbalance of transportation fees, exactions and public improvements may have occurred
- parking may have been overbuilt
- the consequences of urban development on greenhouse gases may have not been properly understood

A Solution

This white paper presents a blueprint for a comprehensive database of vehicle and person trip data for urban and suburban settings. It lays out a significant change from historic practice. ITE will not be able to implement all recommendations at once. To some extent, the speed of this evolution will be a function of the availability of data and the resources available to build the desired functionality. The user of *Trip Generation Manual* and related ITE products should expect to see these changes emerge starting with the next edition.

ITE should continue to deliver trip generation products that meet the needs of all potential users:

- professionals and analysts who develop and review trip generation estimates and who apply them in analyses of transportation access needs and impacts
- the general public, represented by public agencies, for whom ITE serves as the sole resource for technical guidance in this area and represents an assurance of quality
- researchers that attempt to improve upon the relevance and accuracy of trip generation estimates

ITE should expand its current trip generation database to include urban sites, person trip generation data for all types of sites, and data for emerging and evolving land uses for which there are analysis needs. The database needs to grow as new relevant independent, or dependent, variables are identified. The database should provide the ability for researchers and analysts to delve deep into the data, separating out the user application needs from the researcher use of core data. The database should also provide a link to or incorporate other trip-making databases such as parking demand, pass-by and diverted trips, internal capture rates at mixed-use developments, and trip length distributions.

ITE should consider a variety of mechanisms for the production and delivery of documents that contain trip generation charts, tables, text, and data. Options include (1) a printed version that contains a selected set of land uses (at least the most common) along with a selected set of time periods and independent variables, (2) PDFs of land use code subsets, and (3) downloadable databases.

ITE should provide web analytic tools and a graphical user interface (for data and queries) that meet the needs of users from simple to complex. ITE should not let the “fear of misapplication of data” dominate the design of the interface or access to data. The user interface should be simple to use in order to access the open and transparent database. Site data records (i.e., one record for each site and time period) should be in a form that users can convert to spreadsheet form. But before this can happen, issues associated with preserving the confidentiality of study sites must be addressed and resolved.

For the database, any written product, and the graphical user interface, ITE must undertake sufficient analysis and screening to assure its quality. ITE has earned its reputation for delivering quality products and must continue to meet these expectations in order to retain this respect from users of our trip generation data.

This white paper focuses on the development and content of the trip generation database. Each data record consists of three primary components and will continue to do so:

- The characteristics of the study site and its setting
- The time period for the count data
- The person and vehicle count data

Each component is described below.

Study Site Characteristics

The study site characteristics in the trip generation database should consist of (1) values for independent variables for estimating trip generation for the land use type; (2) qualitative and quantitative information covering on-site parking facilities, pedestrian facilities, bicycle facilities, and transit services; and (3) the site address (or closest intersection or latitude/longitude) from which ITE and researchers can derive values for key context measures.

The information listed below comprises a long-term objective for the database content. It is subject to refinement as further analysis of urban trip generation data shrinks or expands the list of useful explanatory variables.

The *italicized text* represents the characteristics that are planned to be added in the future. They will either be derived with the aid of the site address or formally requested from the data contributor.

Each data record should include:

- Data contributor (contact name, organization, mailing address, phone number, email address)
- Date of trip generation count
- Site name and address (street address or closest intersection, city, state/province, zip/postal code, country)
 - The site name and street address need to be omitted from the public data record in order to protect any confidentiality and preclude site-selective manipulations of individual records. Location characteristics will be retained to enable appropriate

spreadsheet manipulations and summaries of data (e.g., summary by a particular area type or subset).

- Land use classification
 - Use description – use the ITE land use codes or the best description possible for all site uses (and note which were counted)
 - It is likely the introduction of urban development types to the database may result in new land use codes that reflect the common practice of mixing land uses in a single building (e.g., first-floor commercial use beneath a several-story residential building)
 - Values for all independent variables that quantify the size and some characteristics of the site (e.g., gross square footage, development units, rooms, students, employees, residents, fueling stations, acres)
 - Occupancy of the site for the appropriate independent variable units (e.g., occupied gross square footage, occupied dwelling units)
 - *Number of building stories*
 - Narrative description of the site
- Parking characteristics for site tenants and visitors
 - Qualitative assessment of parking - narrative describing use and adequacy of on- and off-site parking supply for survey site trips (e.g., on-site parking full during peak periods, quite a few unoccupied spaces, lots of parking off-site)
 - On-site parking
 - Number of on-site spaces
 - *Number of occupied parking spaces (use Parking Generation Form)*
 - *Cost of Parking (for 1st hour, per day, per month)*
 - *Narrative whether parking spaces are designated for specified uses (e.g., reserved for tenant, visitor/resident, customer/employee, compact/standard)*
 - Off-site parking
 - *If off-site parking is used by study site tenants or visitors, narrative describing facilities being used (on-street and off-street), distance from building entrances, and cost of parking*
- Area Type/Site Context – ITE should develop and define an area type classification scheme that can be used by a typical analyst to assign the appropriate area type to a study site and use the appropriate subset of the ITE trip generation database. The criteria used to distinguish between area types will include elements of the site context descriptive measures listed below.
 - Options for initial categories include
 - Urban, suburban, and rural
 - Regional CBD, urban core, activity center, general urban, suburban business district, suburban strip commercial, general suburban, special district, rural town business district, and rural
 - Some other classification scheme based on ongoing analysis of trip generation data
 - *Pedestrian Facilities*
 - *Main or average building entrance setback distance from public sidewalks*
 - *Percent of block faces within ¼ mile with sidewalks*
 - *WalkScore*
 - *Bicycle Facilities*
 - *Distance from building site to nearest bicycle facilities (bike lane, separated bike path)*
 - *Proximity of closest trail system*

- *BikeScore*
- *Transit Facilities and Services*
 - *Bus*
 - *Distance to closest bus stop (if within ¼ mile of the study site)*
 - *Type of bus service*
 - *Number (frequency) of PM peak hour buses stopping within ¼ mile of study site (or for trip generation data collection period if it was outside the weekday street periods)*
 - *Rail*
 - *Distance to closest rail station (if within ½ mile of study site)*
 - *Type of rail service (streetcar, light, heavy, commuter)*
 - *Number (frequency) of trains stopping at stations within ½ mile during PM peak hour (or for trip generation data collection period if it was outside the weekday street peak periods)*
 - *Narrative describing transit fares*
 - *TransitScore*
- *Density of Complementary Land Uses in Vicinity of Study Site (determined by linking data sets)*
 - *Options include:*
 - *Residential population or jobs within ½ mile radius of study site*
 - *Environmental Protection Agency Smart Location Database at the block group level*
- *Proximity to a major trip generator (e.g., a nearby college/university campus, event center/stadium, theme park) that could distort study site trip-making*
- *Narrative that supports or further explains the context characteristics documented above (e.g., nearby land uses, sidewalk quality, street crossing distances, presence of street medians, ADA facilities, connectivity between land uses, bikeshare program)*

Time Period

The future trip generation database should include data for the same time periods that have been reported in recent editions of *Trip Generation Manual*:

- Weekday morning and afternoon street peak periods (7-9 AM, 4-6 PM)
- Weekday peak hour of generator (AM, PM)
- Daily (a greater span of the day where the use is active, in some cases 24 hours)
- Saturday (peak hour of generator, daily)
- Sunday (peak hour of generator, daily)

The time periods should conform to representative and typical conditions, typically by season. For most land uses, this would be the spring or fall; for others, summer or winter is the appropriate season.

Trip Generation Count Data

If the site is not a single-use in a suburban setting with plentiful and free parking and limited transit, a person count disaggregated by travel mode is needed.

- The person count data should be recorded by 5 minute, 15 minute, or 1 hour period on the day of the week and for one or more of the above time periods.

- The travel mode of each counted person should also be determined. Some travel modes may be determinable by counts, but interviews may be necessary to determine a primary travel mode (e.g., people who walk to/from off-site parking or transit stop).
- The travel modes should include by walk, by bicycle, by transit, as vehicle driver, and as vehicle passenger. Further disaggregation is certainly acceptable and may be desirable for local objectives. For example, it could be useful to separate transit person trips by type of transit (e.g., rail versus bus).

If the site is a single-use in a suburban setting with free and plentiful on-site parking, limited transit service, and limited opportunities for walk trips, a vehicle count may be sufficient.

- The vehicle count data should be recorded by 5 minute, 15 minute, or 1 hour period on the day of the week and for one or more of the above time periods.
- The count should include a count of vehicle occupants. If a complete count is not possible, a sample count of vehicle occupancy should be adequate.
- Vehicle classification data should be collected. For many land uses, the distinction can be as simple as 4-or-fewer-tire vehicles (essentially personal passenger vehicles) versus all others (essentially all trucks).
- In a narrative, the level of access by non-personal passenger vehicle modes should be summarized. A rough estimate of person trips by mode (either as a number of trips or as a percentage) is preferred.

The Path Forward

To better understand trip generation associated with a variety of land use and other context settings, the historical practices of trip generation data collection needs to be redirected to focus on the tabulation of person trips by mode (rather than simply vehicle trips). This is particularly needed for proper analysis of sites in urban or mixed-use settings where access by bike, transit, and walk are significant. Person trips and associated mode splits and vehicle occupancies are needed to explain variations in travel between different land uses as well as similar land uses in different built environment contexts. The key determinant in trip generation is the need or desire of people to travel – the person trip.

Several major urban areas (including San Francisco, New York City, Washington DC, and Caltrans) have used and/or collected data on person trip generation for years and interest is increasing in other urban areas. The *ITE Trip Generation Handbook* provides a methodology for collecting person trip data. The count of person trips should also include identification of their modes of travel. A person trip data collection effort for most sites is still within a similar scale of effort (many hundreds of dollars) as a simple vehicle count (a few hundred dollars). At its most complex for a mixed-use site, person trip generation surveys may require interviews at some access points to determine primary mode of travel.

The traditional ITE focus has been on measuring land uses separately, though a site may have multiple uses within it (e.g., ground floor retail with office or residential above). Many urban sites have multiple uses within the same building as compared to mixed use where there are multiple uses on one site. Gathering data for each use, while challenging, provides greater understanding of the trip generation characteristics of the building. The *ITE Trip Generation Handbook* contains a methodology for conducting surveys of mixed-use developments (MXD) that can address person trips for those developments.

Person trip data collection for single-use sites may evolve to the point where some of the methodologies can be used later to improve the MXD method of data collection.

Historically, ITE practitioners have contributed data collected as part of their professional work. ITE should continue to promote this as a critical resource.

ITE should also consider promoting national person and urban trip generation research programs in the United States and Canada to advance our understanding of this topic and the utility of ITE trip generation products. Among other key partners who may be able to fund studies to build the person and urban trip data warehouse are agencies that are members of:

- TRB Major Cities Committee
- National Association of City Transportation Officials (NACTO)
- Association of Metropolitan Planning Organizations (AMPO)
- National Association of Industrial and Office Properties (NAIOP)
- Urban Land Institute (ULI)
- International Council of Shopping Centers (ICSC)

ITE should investigate other agencies that also could enable and support trip generation studies. Historically, FHWA/US DOT and the TRB National Cooperative Highway Research Program have funded trip generation research. Other possible partners include State DOT Pooled Fund studies, cities, and developers.

To provide a cost-effective start toward creating a person trip generation database, the initial focus for person trips might be on land uses and site contexts that are most commonly analyzed and built in more multimodal contexts (such as office, residential, hotel, restaurant, retail and grocery, and entertainment facilities). This would allow ITE to more quickly develop databases with sufficient numbers of sites to afford reasonable accuracy and reliability. It would also allow the early users to assess how to best utilize such data.

ITE Urban and Person Trip Generation Panel

Randy McCourt, Brian Bochner, Stephanie Dock, Kelly Clifton, Kristi Currans, Patrick Gibson, Daniel Hardy, Lee-Jung Kim, Don Samdahl, Gary Sokolow, Garrett Donaher, Kevin Hooper, Lisa Tierney