Overview of Travel Data for Infill, Mixed-use, and Transit-Oriented Development

Terry Parker, Senior Planner, Caltrans HQ Division of Transportation Planning (March 15, 2012)

Background: Local agencies typically require the preparation of transportation impact analyses or studies (TIAs or TIS) of major proposed land use development projects to estimate impacts and identify appropriate measures to reduce or mitigate those effects. Caltrans LD-IGR program staff often use locally-generated TIAs to help determine the effects of proposed land use projects on the State Highway System (SHS) and to identify needed health and safety mitigations. Therefore, *accuracy in TIAs is very important* to ensure that mitigation measures are adequate and appropriate regarding various travel modes and facilities.

Site-Specific Data: Practitioners in the U.S. typically use the Institute of Transportation Engineers' (ITE) vehicle trip-generation rates as a starting point in preparing TIAs.[1] ITE has published vehicle trip-generation estimates regarding a variety of land use categories for many years. However, **ITE cautions that it is not appropriate or accurate to apply these rates to proposed land use projects that are: a) located in downtowns, b) served by public transit, or c) that have transportation demand management (TDM) programs.**[2] The main reason for this caveat is that ITE trip rates data are collected primarily at single-use suburban sites (with plentiful, usually free) parking and no TDMs. In fact, ITE does not include any data collected at sites that do not fit these criteria in its Trip-Generation manual.[3]

Unfortunately, there is no accepted data, method, or tool currently available in the U.S. for estimating trip-generation regarding land use projects proposed in downtowns or other areas served by public transit, such as urban infill and transit-oriented developments.[4,5]

Several recent studies are helping to fill this gap:

- A Caltrans-funded study of **urban infill developments** collected ITE-style cordon count data between 2005-2008 during peak travel times at 26 restaurants, shops, offices, and residential buildings. These projects are located within walking distance of transit stations with frequent service within core areas of the San Francisco Bay Area, Los Angeles, and San Diego.[6,7] This study found that **ITE's trip-generation rates predicted up to twice the number of vehicle trips than were actually measured at these sites.** In addition, professionally-administered intercept surveys (100 at each location) revealed that **up to 50% of trips to and from these sites were by transit, walking, or biking**.

---

[1] *Trip Generation* 8th Edition (2008). http://www.ite.org/emodules/scriptcontent/orders/ProductDetail.cfm?pc=IR-016F

[2] *Trip Generation Handbook: An ITE Recommended Practice (June 2004).* Page 15.

[3] Personal communication with Lisa Fontana-Tierney, ITE's Trip Generation coordinator, Washington, D.C. 2010.

[4] *"Evaluation of the Operation & Accuracy of Five Available Smart Growth Trip Generation Methodologies."* UC Davis Inst. of Transportation Studies, for Caltrans. Sept. 2011: p.2-6. http://pubs.its.ucdavis.edu/publication_detail.php?id=1495

[5] However, such data is collected and provided in several other countries, such as in the UK and Ireland as well as Australia and New Zealand. For more information, see: http://www.trics.org/

[6] ITE Journal, *"Trip Generation Rates for Urban Infill Land Uses in California"* June 2009. James Daisa & Terry Parker. http://www.dot.ca.gov/hq/tpp/offices/ocp/sp_files/Trip_Generation_Rates_for_Urban_Infill_Land_Uses_in_CA_ITE_Journal_June2009.pdf

[7] *"Trip-Generation Rates for Urban Infill Land Uses in California - Phase 2: Data Collection FINAL REPORT."* By Kimley-Horn & Associates for Caltrans HQ Divisions of Transportation Planning and Research. June 15, 2009. At: http://www.dot.ca.gov/research/researchreports/reports/2009/final_summary_report-calif._infill_trip-generation_rates_study_july_2009.pdf

- A national Transit Cooperative Research Program (TCRP) study of transit-oriented developments (TODs)[8] collected cordon count data at 17 multi-family housing developments (each with 90 to 854 non-subsidized dwelling units) in four metropolitan areas of the U.S. These sites included five suburban TODs located near BART stations in the SF Bay Area.[9] This study found that these housing units produced an average of **50% fewer automobile trips during peak travel hours compared to ITE trip-generation estimates for the same land use categories. They also had high rates of transit use, walking, and biking.**[10]

These findings should be considered for use in TIAs and related work.

Caltrans is also currently conducting additional research to further understand travel characteristics of smart growth development:

Projects Underway:

- **Smart Growth Trip-Generation Method:** Since 2009, Caltrans staff and researchers at the UC Davis Institute of Transportation Studies (ITS) have been working to develop a method for adjusting ITE trip-generation rates for urban infill, TOD, and mixed (e.g., smart growth) land use projects in California. This effort uses cordon count data for such projects from previous studies, and is also obtaining a significant amount of additional data at smart growth sites in California. When completed in 2013, this method will be available for estimating trip-generation rates for smart growth development projects proposed in various locations in California, and potentially also throughout the U.S.[11]

- **Smart Growth Planning Tools:** Caltrans is also funding a **major effort to obtain and develop data and software tools for use in integrated land use/transportation planning at local and regional levels in California.**[12] The results are being incorporated into various GIS-based planning and visualization tools that provide quantitative and visual information about various options being considered. California's SB375 requires MPOs to use such tools in developing Sustainable Communities Strategies (SCS).[13] This project is also providing analysis tools that significantly increase the ability of regional and local agencies to evaluate the effects of various land use/transportation scenarios being considered, including those with smart growth components. These new planning tools will be available by Fall 2012.[14]

(continued on next page)

---

[8] TCRP H-128: "Effects of TOD on Housing, Parking & Travel, 2008." http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_128.pdf

[9] Metropolitan areas: Washington D.C.; Portland, Oregon; SF Bay Area; and Philadelphia, PA-Newark, New Jersey. The five Bay Area sites are located near BART stations in Fremont, Hayward, Union City, and Walnut Creek.

[10] ITE Journal, *"New Transit Cooperative Program Research Confirms Transit-Oriented Developments Produce Fewer Auto Trips"* June 2009, by G.B. Arrington & Kimi Iboshi Sloop.http://www.dot.ca.gov/hq/tpp/offices/ocp/sp_files/Transit-Oriented_Developments_Produce_Fewer_Auto_Trips_-_ITE_Journal_June_2009.pdf

[11] http://www.dot.ca.gov/hq/tpp/offices/ocp/sp_files/Fact_Sheet_Trip_GenRates_Smart_Growth_Land_Use_july2011.pdf

[12] http://www.dot.ca.gov/hq/tpp/offices/ocp/sp_files/Fact_Sheet_Tools_for_Regional_Local_Smart_Growth_july2011.pdf

[13] California Transportation Commission (CTC) 2010 Adopted Regional Transportation Plan Guidelines 4/29/2010. See Chapter 3 – "Modeling" pp. 48 & 49.

[14] **For more information on these Caltrans-sponsored projects, contact: Terry.Parker@dot.ca.gov**

Updated Literature Review:

As part of these two Caltrans-funded efforts, the study teams reviewed and summarized recent nationally-available research on quantitative relationships between the built environment and travel.[15] This analysis found that certain land use variables -- especially **location, density, land use mixture, and connectivity** – significantly influence travel.[16]

Studies indicate that the **location** of development within or near a metropolitan area is the most important factor. Places that have high levels of accessibility to employment and other destinations typically also have lower rates of vehicle travel compared to areas farther from an urban core. The **density** of population, employment, and services is also a very important factor. In addition the **mixture** ("diversity") of various types of land uses (e.g., shopping, housing, employment), as well as the **connectivity** of travel networks (number of roadways or intersections, transit service, bicycle facilities, and sidewalks) are also influential factors.

Overall, this review concluded that **lower levels of per capita vehicle travel** (both vehicle trips *and* vehicle miles of travel) **are typically found in places with attractive and efficient alternatives to automobile travel.**

[15] *"Annotated Literature Review of Land Use-Transportation Relationships"* January 2012. Available at: http://www.dot.ca.gov/hq/tpp/offices/ocp/sp_files/Annotated_Literature_Review_of_Land_Use-Transportation_Relationships_January2012.pdf

[16] Note: It is also widely recognized that demographic variables, especially income, household size and composition, and automobile ownership/availability, also significantly influence travel behavior.