

# **FY 07/08 Research Initial Scope of Work**

I. Project Title: "Develop Trip Generation Rates for Urban Infill Land Uses in California"

Task Title: "Trip Generation Rates for Urban Infill Land Uses in California - Phase 2" (Task #1221)

## II. Project Problem Statement

Currently the Caltrans Local Development-Intergovernmental Review (LD-IGR) Program, as well as local agencies throughout California, often use the Institute of Traffic Engineers' (ITE) published trip-generation rates when assessing potential traffic impacts of various types of land use development projects on affected State highways and local streets. However, these ITE trip generation rates are based in large part on single-use, suburban study sites, and do not currently account for differences in automobile trip generation rates or travel mode shares (e.g., rates of travel by automobile, transit, or non-motorized modes) of such land uses in relation to the location and density of surrounding development, mixture of land uses, accessibility to transit services, or the availability of bicycle and pedestrian facilities. Therefore, relying on existing ITE trip generation rates to assess potential vehicle travel associated with proposed land use developments that are located within California's existing urban areas may result in inaccurate estimates of their traffic impacts.

## III. Objectives of Task

The objective of Task #1221 is to augment a Caltrans-funded research effort to develop acceptable California trip generation rates that are sensitive to the locations, densities, and available transportation modes for a set of urban infill land use categories.

Task #1221 is an extension of a Phase 1 effort (currently underway) that has defined and described the terms "urban" and "infill" for the purposes of this research; located, described, and mapped appropriate study site areas; and developed and started to apply appropriate processes and procedures for collecting and analyzing trip generation data for an initial set of urban infill land uses in California. These tasks have all been conducted in close coordination with ITE as well as members of a representative Technical Advisory Committee (TAC) that was established to provide input and guidance regarding this study.

Phase 2 of this effort will produce and report additional trip generation rates data for the current and an expanded set of urban infill land uses in California using the same methodology, criteria, and procedures that were developed and described during Phase 1 of the study. (Phase 1 of this research, currently underway, will be completed and reported by Spring 2008).

The ultimate goal of this effort is to gain acceptance for using these data in assessing the traffic impacts of various land use development projects located in urban infill areas in California as part of planning processes, traffic impact studies, traffic impact mitigation programs, and in compliance with the California Environmental Quality Act (CEQA). To meet this goal, a primary objective of this overall research Project is to conform to ITE land use categories and data collection protocols to the extent feasible so that the results will eventually be incorporated into future ITE publications.

# FY 07/08 Research Initial Scope of Work

## IV - Background

Current ITE trip-generation rates only account for automobile trips generated by land use developments - regardless of a project's location, the surrounding area's development density, mix of uses, and/or the availability of other types of travel facilities or services. These ITE rates have been the primary data source for conducting travel demand and traffic impact analyses of new land use development projects throughout the United States for many years, and they are relied upon for the Department's LD-IGR Program as well as local agencies' traffic impact analyses.

However, these trip generation rates are often not adequate to guide the analysis of proposed developments that are located within urban areas. By design, land uses that are selected for ITE study have primarily been single-use and located on discrete suburban sites. Because of this, ITE trip generation rates currently do not reflect variations in density, diversity (land use mix), site design, or multimodal transportation characteristics typically available in metropolitan areas, which are critical factors that may influence the amount and type of travel by residents, customers, and employees.

The current Caltrans-funded Phase 1 task has already developed and described criteria for selecting candidate sites for data collection in infill locations, and has provided a methodology for data collection and analysis. This Phase 1 effort has already completed a number of tasks that have established a framework for the research, including:

- q Defined "urban" and "infill" within California's metropolitan areas (in which urban and suburban areas often blend);
- q Identified and defined the land use types and densities/intensities of land uses to include in the research;
- q Established a methodology of collecting trip rates data through the use of intercept surveys. (This method was adopted because the trip generation of many urban land uses cannot be captured by counting vehicles at site driveways);
- q Established a methodology to derive trip generation rates based on the data collected in the intercept surveys;
- q Conducted a pilot study of several land uses to test the intercept survey methodology; and
- q Initiated collecting data statewide.

Phase 2 of this research effort (e.g., FY 07/08 Task 1221 described in this Initial Scope of Work) will build directly upon the methods and data established and work completed during Phase 1 of this effort in order to augment the database and validity of data already collected.

## V. Description of Work and Expected Deliverables for Task

### Minimum Contractor Qualifications:

The contractor and/or appropriate subcontractor(s) will have a thorough understanding of ITE trip generation data collection concepts and procedures, the ability to conduct

## FY 07/08 Research Initial Scope of Work

professional-level statistical data analyses, and will have previous experience with actually developing actual trip generation rates (not just applying them). The contractor and/or subcontractor(s) will also have previous experience conducting transportation and travel-related research, including preparing written memoranda and reports acceptable for publication.

The contractor that is selected for Task #1221 will conduct the following tasks as described:

- Task 1 - Review Research Completed to Date

The selected contractor is expected to have a working knowledge of the written information that was produced as part of the Caltrans-funded Phase 1 research effort, which consists of the following written documents, which are briefly described below (click on these links to access each item):

- A. [Working Paper #1: "Selection of Urban Infill Study Sites"](#)
- B. [Working Paper #1: "Selection of Urban Infill Study Sites" \(Appendices\)](#)
- C. [Working Paper #2: "Site Selection and Data Collection/Analysis Methodology"](#)
- D. [Memorandum summarizing methodology and results of the pilot Infill Trip Generation survey](#)

A. Working Paper #1 - "Selection of Urban Infill Study Sites" - defines and describes 'Urban Infill' development, the attributes of Urban Infill Areas (UIA), and identifies the infill land use types that were selected during Phase 1. This paper also discusses the methods and criteria used for identifying and selecting appropriate infill zones and survey sites across California for data collection as part of this study.

B. Working Paper #2 - "Site Selection and Data Collection/Analysis Methodology" - identifies the finalized urban infill area criteria, as well as site selection and data collection methodology. This paper also identifies ten land use categories that were selected for data collection and agreed upon by members of the study's Technical Advisory Committee (TAC) during Phase 1. The list of land use categories to be studied will be expanded during Phase 2.

C. Pilot Infill Trip Generation rates survey memo - The researchers who are implementing Phase 1 of this effort conducted a Pilot Study in 2006 to test the use of intercept surveys for data collection at three San Francisco Bay Area locations. A memorandum summarizes the processes, key findings, and lessons learned from this pilot study (see Item C above). The lessons learned from the pilot study have been integrated into the survey forms and data collection methodology that is being used for the remainder of the effort (and described in Working Papers #1 and #2).

If the selected contractor wishes to propose any significant changes, enhancements, or improvements to the research methodology that was developed during Phase 1, those changes must first be coordinated with the TAC prior to implementation and are also

## **FY 07/08 Research Initial Scope of Work**

subject to the review and written approval of the designated Caltrans project manager (PM) for this study.

· Task 2 - Coordinate with Technical Advisory Committee (TAC), ITE, and NCHRP

Subtask 2.1 - Coordinate with Study TAC: During Phase 1, a group of local, regional, and technical staff were identified and convened as part of a Technical Advisory Committee (TAC) to provide ongoing input into this effort. The selected contractor will continue to coordinate all significant Phase 2 work with members of this TAC. The selected contractor will schedule and conduct TAC meetings at least once per calendar quarter throughout the duration of the study - either in-person or by phone (as appropriate) - to provide the members updates of the study's progress and obtain input from them regarding how it is being conducted and its deliverables.

The selected contractor (and/or appropriate subcontractor[s]) will conduct all of the following activities regarding every TAC meeting as described:

- 1) Communicate (via email or phone) with members of the TAC and the Caltrans project manager (PM) to identify convenient dates and times during which most TAC members and the PM will be available at least one month before each TAC meeting;
- 2) Email an announcement to TAC members regarding the proposed time, date, and location no later than three weeks before each meeting;
- 3) Create a proposed written Agenda of items to be discussed, email it to the Caltrans PM at least two weeks prior to each meeting, and incorporate the PM's suggested changes into the Agenda, as appropriate;
- 4) Email the Agenda, along with any other relevant information, to members of the TAC no later than one week prior to each scheduled TAC meeting;
- 5) Locate, pay for, and set up meeting rooms and/or 1-800 conference call numbers as appropriate for each meeting (note: costs may be reimbursed via invoices submitted to the Caltrans PM);
- 6) Conduct each TAC meeting (in a professional manner) by:  
Asking each participant to introduce themselves, facilitating discussion of Agenda items, noting and responding to all relevant comments from TAC members (as appropriate), guiding the meeting discussion to ensure that it covers all items listed on the Agenda, and closing the meeting in a timely manner.
- 7) Prepare clear and concise summary meeting notes, email them within one week of the TAC meeting to the Caltrans PM for review and approval, and incorporate the PM's suggestions (as appropriate) into the notes;
- 8) Email summary meeting notes to TAC members within one week after receiving review and comment about them from the Caltrans PM (if not sooner).

If the selected contractor wishes to propose any significant changes to the membership of the TAC, the frequency of TAC meetings, or how TAC meetings are conducted, those changes must be coordinated with the TAC members prior to implementation and are also subject to review and written approval by the Caltrans PM.

## **FY 07/08 Research Initial Scope of Work**

Subtask 2.2 - Coordinate with ITE. One of the primary objectives of this research is that the data collected will eventually be integrated into a future version of ITE Trip Generation or other relevant ITE publication. This requires developing methods and analyzing data in a manner and format that is acceptable to ITE based on peer input and review by individuals and/or committees recommended by ITE, in addition to coordinating with the study's existing TAC. Therefore, the selected contractor is expected to continue close coordination of this research with individuals and/or committees that ITE staff recommends to provide independent review and input to the study.

Subtask 2.3 - Coordinate with NCHRP. The National Cooperative Highway Research program (NCHRP) recently announced approval of a new project #08-66 "Trip-Generation Rates for Infill Land Use Developments in Metropolitan Areas of the U.S." This national-scale research (which was proposed to NCHRP by the Caltrans PM for the California trip generation rates effort) will be initiated in Federal Fiscal Year 2008. Its primary objective is to establish, document, and disseminate a methodology for producing and applying vehicle trip generation rates data for infill land use projects located within existing urban and suburban areas throughout the U.S. Another major objective is to collect, analyze, and report on vehicle trip generation rates data for several types of land uses in a sample of existing urban and suburban infill locations in a selection of U.S. metropolitan areas. The NCHRP problem statement references the existing Caltrans urban infill trip generation rates research. The contractor selected for Caltrans Task #1221 will be expected to coordinate as needed with NCHRP panel members and researchers regarding NCHRP Project #08-66. The contractor selected for Caltrans Task #1221 is also be expected to coordinate as needed with NCHRP panel members and researchers regarding NCHRP Project #08-51: "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments." (See Section VII - Related Research).

### · Task 3 - Review Criteria for Selecting Sites

The criteria to be followed in identifying and selecting urban infill sites for data collection have already been developed and described during the current Phase 1 research effort. The selected contractor will thoroughly review the study site selection criteria described in Working Papers #1 and #2 that were developed during Phase 1. The contractor may suggest changes, enhancements, or improvements to the site selection criteria - but only as long as those changes, enhancements, or improvements are consistent with the Phase 1 research, and as long as the implementation of such changes does not invalidate the data that was collected in Phase 1 (i.e., via the use of a different data collection or survey methodology).

### · Task 4 - Site Selection

During Phase 2, the selected contractor will develop, analyze, and report data for a minimum of 15 land use categories. For each of these land use categories, the contractor will collect and analyze data at a minimum of five locations, closely following the methodologies developed during Phase 1. During Phase 2 of the study, the selected

## **FY 07/08 Research Initial Scope of Work**

contractor will propose a set of land use categories for study to the study's TAC and the Caltrans Project Manager, and may initiate data collection only after receiving approval of those suggested categories from the TAC. These categories must include additional land uses that were not previously studied during Phase 1. They may also include selected categories that were identified as priorities during Phase 1 but for which insufficient data was collected during Phase 1, or for which it is determined that additional data is desirable due to the importance of those types of land use categories in urban infill locations.

The selected contractor will also follow the procedures previously identified in Phase 1 for selecting specific sites for data collection. Site selection should be geographically distributed for each category and must include data from at least the following regional areas (in specific places that adhere to the locational criteria described in Working Papers #1 and #2):

- San Francisco Bay Area
- Sacramento area
- Los Angeles area
- San Diego area

Before initiating data collection efforts, the contractor must first verify that the sites proposed for data collection meet the density, transit proximity, context and all other requirements established and described in Phase 1.

The contractor will also build upon the personnel and organization/agency contacts which have been established in Phase 1 in order to take advantage of progress and experience that was previously gained and to avoid unnecessary duplication of effort in identifying sites and data collection.

- Task 5 - Pre-Data Collection Work

The selected contractor also must gather, organize, and record all pre-data collection work required to adequately conduct the analyses. The pre-data collection work identified during the Phase 1 research includes all of the following steps:

- Identification of individual study sites.
- Mapping sites (using GIS) to verify that they meet the housing and employment density, the transit proximity criteria, and all other criteria. (Note: GIS mapping of population and employment densities in California are described in Working Paper #1.)
- Obtaining permission from property owners/managers necessary to survey employees, shoppers, tenants, and other users.
- Conducting pre-survey tasks, which may include preparing fliers for distribution to employees and/or tenants of sites, obtaining necessary insurance, and visiting and discussing the surveys with managers and/or security personnel.

## **FY 07/08 Research Initial Scope of Work**

- Gathering and organizing the land use information obtained, including (as appropriate): number of dwelling units, commercial square footage, percent occupancy, number of access points, and other information as necessary to define the independent variables and to describe the site.
- Describing (in writing) the context in which the site is located.
- Subcontracting and/or training of site surveyors (the use of experienced professional surveyors is highly recommended and may be required).

Due to significant challenges experienced during Phase 1 in obtaining permission from property owners and managers required in order to conduct on-site intercept surveys, proposals for Phase 2 must provide a strategic and workable methodology for overcoming this implementation barrier.

### · Task 6 -Data Collection Methodology

The contractor will use a random intercept survey technique to collect travel information from an adequate sample of users of urban infill land uses in the derivation of automobile trip generation rates and other modes for the peak hours of adjacent street traffic. Intercept surveys collect data from a sample of the user "population," and this sampling procedure assures that each element in the population has an equal chance of being selected. The random intercept survey technique is being used as part of the current Phase 1 research primarily due to the limitations of implementing automated traffic-counting tubes in infill locations - which often do not have separate parking areas, or have shared-use parking areas that are not restricted to individual land uses.

Intercept surveying should be conducted on Tuesday, Wednesday, and Thursday of the week and during the morning (7:00 AM to 9:00 AM) and evening (4:00 PM to 6:00 PM) peak hours, unless the land use category requires conducting surveys on other days of the week and/or at different time periods (i.e. retail uses may peak in the mid-day, theaters peak in the evening on weekends, etc.).

Intercept survey forms have already been created as part of Phase 1 for various urban land use categories and should be used (or may be slightly revised to meet the specific needs of sites). Surveying may only be conducted during non-holiday periods when schools are typically in session.

RFP proposals must also include a description of an acceptable methodology for collecting or otherwise developing total daily trip generation data for each study site that will be acceptable for use in air quality analyses of proposed land use projects. This methodology may be developed in coordination with qualified staff of air quality management agencies in California.

The selected contractor may suggest changes or improvements to data collection procedures and intercept surveys, as long as consistency is retained with results of Phase 1 research and proposed changes are agreed-upon by members of the study's TAC. In addition, the Caltrans Project Manager must approve any significant changes in methodology prior to their implementation.

## **FY 07/08 Research Initial Scope of Work**

- Task 7 -Data Analysis and Reports

The selected contractor will analyze the empirical data collected during Phase 2, derive trip generation rates, and compare the results with the ITE Trip Generation Handbook, 7th Edition. The results, observations, and key findings of the empirical analysis will be summarized and reported, and the raw data and detailed calculations compiled in a technical appendix (in both written and electronic forms). Study site locations will be precisely identified using street addresses and geographic coordinates, and provided in digital formats, which may include Keyhole Markup Language (KML) or ESRI shape files. Empirical analyses will be presented in written form and reviewed with the TAC and Caltrans Project Manager, and relevant comments incorporated as appropriate.

- Interim deliverables will include: technical memoranda and/or working papers summarizing site selection procedures and results, methodologies used, data collected, and key findings of the research.

- Final deliverables will include:

- o Draft Final Report: The selected contractor (or appropriate subcontractor) will prepare a Draft Final Report including an executive summary, detailed description of analyses and findings, recommendations for implementation, and suggestions for future research, as well as a separate detailed technical appendix with data and analyses presented in clear and understandable form. The selected contractor will provide the TAC and Caltrans PM at least one month to review and comment on the draft final report, and will hold a TAC meeting to discuss it. The contractor will respond to and address all relevant comments, and will include suggested changes in developing the Final Report, as appropriate.

- o Final Study Report. The selected contractor will prepare a Final Study Report after receiving and incorporating relevant comments, as appropriate, regarding the Draft Final Report from the TAC and the Caltrans PM. The accepted Final Report and all related data and documents will be provided on a CD to the Caltrans Project Manager in Microsoft Word (and/or other mutually agreed-upon software).

### Requirements regarding Written Submittals

Written documents that the selected Contractor or subcontractor(s) submits to the Caltrans PM and/or study TAC (other than rough topic outlines) must meet minimum standards for clarity, organization, formatting, and English grammar. These documents will also provide complete and accurate documentation of all citations, quotes, and photos. In addition, the Contractor will provide separate written permission from copyright owners necessary to reprint or quote any copyrighted materials. Technical words or terms (e.g., that may not be familiar to non-engineers) must be clearly defined and described in footnotes or an appendix.

## **FY 07/08 Research Initial Scope of Work**

Written draft or final "deliverables" (including all of those listed above) that fail to meet these minimum standards will be returned to the contractor for correction prior to acceptance and payment of invoices for costs incurred during their preparation.

The selected Contractor will provide the Caltrans PM at least two weeks to review and comment on all proposed draft "interim deliverables" and will incorporate all of the PM's relevant comments and suggestions into those documents - as appropriate - before distributing them to the TAC.

### **VI - Estimate of Funding and Duration of Task**

This study is estimated to have a duration of about two years.

### **VII - Related Research**

The National Cooperative Highway Research Program (NCHRP) recently announced approval of a new research project #08-66 "Trip-Generation Rates for Infill Land Use Developments in Metropolitan Areas of the U.S." This national-scale research (which was proposed to NCHRP by the Caltrans PM for the California trip generation rates effort) will be initiated during Federal Fiscal Year 2008. Its primary objective is to establish, document, and disseminate a methodology for producing and applying vehicle trip generation rates data for infill land use projects located within existing urban and suburban areas throughout the U.S. Another major objective is to collect, analyze, and report on vehicle trip generation rates data for several types of land uses in a sample of existing urban and suburban infill locations in a selection of U.S. metropolitan areas. The NCHRP problem statement references the current Caltrans-funded trip generation rates research (and so the contractor selected for Caltrans Task #1221 will be expected to coordinate with the panel members or investigators of NCHRP Project 08-66 as necessary).

Another related research effort is being conducted through NCHRP Project #08-51: "Enhancing Internal Trip Capture Estimation for Mixed-Use Developments." This project will produce a methodology for enhancing internal trip capture estimates that includes: (1) a classification system of mixed-use developments that identifies the site characteristics, features, and context that are likely to influence internally-captured trips, and (2) a data-collection framework for quantifying the magnitude of internal travel to and around mixed-use developments to help determine the appropriate reduction rates. This research includes a pilot data collection effort utilizing intercept surveys to test the methodology. (The contractor selected for Caltrans Task #1221 may also be expected to coordinate with the panel members or investigators of NCHRP Project #08-51).

### **VIII - Deployment Potential**

This effort will produce a final report and dataset(s) providing detailed results and recommendations regarding mode-specific trip generation rates for local urban infill land use development categories in California. Such data will be useful in assessing traffic impacts and benefits of such development projects as part of the Department's LD/CEQA

## **FY 07/08 Research Initial Scope of Work**

program, as well as local agencies' land use development review and permitting processes. The ultimate goal of this and related efforts is to eventually gain acceptance for the application of this data in assessing the traffic impacts of land use developments located in urban infill areas as part of planning processes, traffic impacts studies, traffic impact mitigation programs, and compliance with the California Environmental Quality Act (CEQA) and potentially also the National Environmental Protection Act (NEPA). Therefore, one of the primary objectives of this overall research Project is that the methodologies developed and data that are provided by the Caltrans and NCHRP-funded tasks will eventually be integrated into a future version of ITE Trip Generation or other relevant nationally-distributed ITE publications.

### **IX - Date and TAP/PSC**

Prepared and submitted by the "Land Use/Regional/Economic" TAP, in the "Planning/Policy/System Information" Program Steering Committee - July 18, 2007.  
Re: Project Panel - Review and input regarding this Initial Scope of Work was provided by members of the Technical Advisory Committee (TAC) for the Infill Trip Generation Rates in California task (Phase 1, currently underway). The TAC includes: Caltrans Headquarters and District staff; representatives of several transportation planning agencies, local governments, and transit agencies; transportation consultants; and members of the Institute of Transportation Engineers (ITE). (A list of TAC members will be furnished upon request).