

**FINAL**

**WORKING PAPER #2  
SITE SELECTION AND DATA COLLECTION/ANALYSIS  
METHODOLOGY**

**REVISED MAY 2006**

**Prepared for:**

California Department of Transportation  
Technical Advisory Committee

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In Association with:

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## **I. Revisions to the Working Paper**

Subsequent to the February 13, 2006 discussion with the TAC and further conversations with the ITE liaison (Gene Arnold), the consultant team has revised the proposed methodology (see Attachment 1 for a summary of the February 13 meeting). It was agreed that the ITE methodology for conducting trip generation surveys was only suitable for isolated suburban locations and even if an urban site could be identified that met ITE's criteria, the resulting data may not be representative of typical urban site characteristics. Therefore it was agreed that the trip generation study would use intercept surveys for the collection of data. Gene Arnold agreed with this approach and indicated that because the ITE Trip Generation Manual is an Information Report, they would accept our methodology into their collection of trip generation studies. We would need to provide a detailed description of our methodology. Section VII below has been revised to reflect the change in methodology.

Additional issues addressed in this revised working paper include:

- Final Land Use Categories:
  - Expand on the qualifier to all land use categories that selected sites can be part of a mixed-use development as long as use is isolated enough to collect necessary data (in this case intercept survey data).
  - It is acceptable to diverge from the strict ITE definition of land use categories to better reflect urban areas.
- Final Urban Infill Area Criteria:
  - Revise criteria to accept the use the collective headways of multiple routes as long as the routes served the same corridor for a considerable length of the corridor.
- Site Selection Methodology:
  - Combine the Monterey Bay/Santa Cruz region with the San Francisco Bay Area region.
  - Combine San Bernadino and Riverside counties with the metropolitan Los Angeles region.
  - Retain the Sacramento area as a separate region.
  - Allocate 50% of study sites to the Northern California regions and 50% to the Southern California regions, then allocate study sites to counties based on the proportion of population and employment in the census block groups that meet UIA criteria, rather than countywide population.
- Data Collection Methodology:
  - Use intercept surveys to collect data (see revised Section VII below).
  - Include retail study sites as small as 10,000 square feet for the Shopping Center land use category.
  - The Data Summary Report will list each study site separately with all the independent variable data and count data collected for that site.
  - The study will report additional information on the characteristics of the areas surrounding the study sites and provided as supplemental data in the appendices.

This additional information would include a combination of quantitative and qualitative characteristics of the site's surrounding district such as land use mix, densities, network attributes, pedestrian system, predominate uses, amenities, etc.

- Use of Pilot Surveys:
  - The use of intercept surveys will be tested through a series of pilot studies in the San Francisco Bay Area region. An initial selection of between 5 and 10 land uses will be selected for the pilot studies. The findings of these surveys will be used to refine the methodology for collection of the full set of sites.

## **II. Introduction and Objectives**

This paper presents a detailed methodology and criteria for selecting candidate sites for data collection, guidelines for data collection at individual sites, and a methodology for analyzing data. The objectives of this working paper are:

- 1) Establish a technical procedure that moves the study from mapping of Urban Infill Areas to the selection of individual sites for data collection.
- 2) Develop guidelines for the collection and analysis of trip generation data recognizing that the study of urban areas will not be able to utilize the Institute of Transportation Engineers' (ITE) recommended data collection methods.
- 3) Establish a process with the ITE liaison to review and approve key steps and procedures.

## **III. Proposed ITE Review Process**

The Institute of Transportation Engineers (ITE) has agreed to review material developed as part of this study. The project team has proposed to ITE participation of a technical liaison comprised of ITE staff and/or member(s) of the ITE Trip Generation Committee. ITE staff participation will be limited to receipt of material developed as part of the study and be available to provide advice on technical matters. ITE will review the trip generation findings at the time we submit them. For participation in the development of the study, we have tentatively agreed to work with Mr. Gene Arnold, a Senior Research Scientist at the Virginia Transportation Research Council. While Mr. Arnold does not represent ITE, he was recommended by ITE and has been involved in the review and development of past trip generation manuals. The process for ITE review is outlined below:

- The project team will provide key information to be reviewed and considered by the liaison. ITE will be copied on all material provided to the liaison. Proposed key information includes:
  - definition of urban infill areas (UIA);
  - UIA selection criteria;
  - proposed ITE land use categories;
  - method and criteria for selecting individual study sites;
  - data collection guidelines and technical methods;
  - identification of independent variables; and

- statistical analysis methods.
- The liaison will be invited to participate in relevant TAC discussions.
- The project team will hold discussions with the liaison specifically on the proposed methodology.
- The project team will work with both ITE staff and the liaison document the methods, data, and analysis for eventual submission to ITE for possible incorporation into a future version of the Trip Generation manual or other trip generation Informational Report.

#### IV. Final Site Selection Criteria

As agreed upon by the TAC at its December 20<sup>th</sup>, 2005 teleconference, the following criteria will be used to select study sites:

- 1) A Urban Infill Area (UIA) designation may be applied to any site located either:
  - a) within a **Central Business District (CBD), Central City, Not Downtown (CND) or Suburban Center (SBC) Area**, as defined by the ITE for data collection surveys (ITE definitions of these areas is attached as Attachment 2); or alternatively,
  - b) within a **General Urban (T/CZ-4), Urban Center (T/CZ-5), or Urban Core (T/CZ-6) Context Zones**, as defined in the Proposed Recommended Practice for Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities estimated to be published in February 2006 (Attachment 3 provides characteristics of these context zones), which **also** meets all of the other criteria defined immediately below.
- 2) The UIA must be within 1/3 mile of a site with an existing or future rail transit station, a ferry terminal served by either a bus or rail transit service, an intersection of at least two major bus routes, or within 300 feet of a bus rapid transit corridor. The transit service shall have maximum scheduled headways of 15-minutes for at least 5 hours per day. It is acceptable to use the collective headways of multiple routes as long as the routes serve the same corridor for a considerable length of the corridor. This reflect corridors where people can use any route to reach any point within a significant length of the corridor.
- 3) The UIA can contain no more than 10 percent Vacant Developable Land. Vacant Developable Land as defined excludes water bodies, public rights-of-way, land designated for conservation and public recreation, and any other land designated by local governments' policies or comprehensive plans as unavailable for development. Parking lots on land designated and/or zoned as developable under current policy qualify as Vacant Developable Land.
- 4) Where residential land uses comprise at least 60 percent of developed land, average residential density shall be at least 10.0 dwelling units per gross acre of residentially developed land, or

- 5) Where nonresidential land uses comprise at least 60 percent of developed land, average nonresidential density shall be a floor area ratio (FAR) of at least 1.0 and/or an employment density of at least 35.0 per gross acre of nonresidential developed land, or
- 6) Where neither residential nor nonresidential uses comprise more than 60 percent of developed land, both residential and nonresidential uses must meet the density and intensity criteria prescribed above.

## **V. Recommended Land Uses (ITE Categories)**

Below are the ten land uses agreed upon by the TAC, arranged in order by ITE land use code:

- (223) Mid-rise apartment
- (230) Residential condominium/townhouse (mid-rise)
- (232) High-rise residential condominium/townhouse
- (445) Multiplex movie theater
- (492) Health/fitness club
- (565) Day care center
- (710) General office building
- (820) Shopping center
- (850) Supermarket
- (932) High-turnover sit down restaurant

Table 1 also lists these land uses and provides their descriptions as published in the ITE Trip Generation Manual (7<sup>th</sup> Edition). In addition to the ITE description, Table 1 presents qualifications or recommendations specific to the urban infill trip generation study, if applicable. There are qualifiers/recommendations for four of the categories:

- (230) Residential condominium/townhouse – In the ITE Trip Generation Manual, this is a general category of residential use without a definition of height of building. The data included low and high-rise buildings. For purposes of the urban infill trip generation study, we recommend that we limit this category to mid-rise buildings of between three and ten stories.
- (232) High-rise residential condominium/townhouse – In the ITE Trip Generation Manual, this category represents buildings of three or more stories in height. For purposes of the urban infill trip generation study, we recommend that we limit this category to high-rise buildings greater than ten stories.
- (565) Day care center – In the ITE Trip Generation Manual, day-care centers are defined as a free-standing facility. For purposes of the urban infill trip generation study, we recommend that we do not limit potential study sites to free-standing facilities (e.g., can be part of a larger building or facility) as long as it is open to the general public and has access/parking isolated enough for the collection of accurate data.

- (820) Shopping center – The ITE Trip Generation Manual no longer provides different rates for different size shopping centers (less than or greater than 600,000 square feet). This was discontinued in the 5<sup>th</sup> Edition of Trip Generation because 1) there was confusion as to which rate to use when the shopping center was close to the threshold, and 2) it was determined that the regression equations accurately predicted the change in traffic based on the size of the center. These findings were based on a study of 345 shopping centers classified as either neighborhood, community, regional, or super-regional centers (Peyrebrune, Joan C. “Trip Generation Characteristics of Shopping Centers”. ITE Journal. June 1996, Pg. 46-50.) For this study retail sites can be part of a mixed-used development.

In addition to the above qualifiers, most of the land uses include qualifiers that allow the site to be part of a mixed-use development, or integrated into a larger complex. This qualifier reflects the change in data collection from traffic counts to intercept surveys.

## **VI. Proposed Site Selection Methodology**

The proposed site selection is based on an approach that relies on both quantitative and qualitative measures and decision-making procedures. It is useful to organize the site selection process in terms of region, county, city, district, and site and to develop criteria for selecting study areas at each geographic level. This organization is summarized below.

### Objectives of Site Selection

The overall purpose of the site selection is three-fold, 1) to identify sites distributed within urban areas throughout the state so that data collection is representative of the trip generation of uses within all regions of California, 2) to ensure candidate site are within areas that meet the criteria for UIA, and 3) to ensure that the candidate sites have the appropriate characteristics for proper data collection. Specific objectives of site selection are:

- To ensure a distribution of candidate sites throughout the state, capturing a cross-section of the state’s urban areas. Statewide distribution of sites is intended to capture differences in trip generation that might be reflective of geographic location.
- To select candidate sites in a distribution of urban infill areas at the region and county level proportional to population.

#### A. Determine the Geographic Distribution of Study Sites

- Geographic Distribution of Study Sites by Region

Selection criteria: divide number of study sites (50) to survey 50% of the sites in Northern California and 50% of the sites in Southern California regions. Divide state into four metropolitan regions. These regions contain concentrations of census block groups which meet the minimum density criteria for housing or employment (see Working Paper #1).

**Table 1: Final List of Land Uses for the Urban Infill Trip Generation Study**

Land Use Group	ITE LU Code	ITE Land Use Type	ITE Description	Additional Qualifiers for Trip Generation Study
Residential	223	Mid-Rise Apartment.	Mid-rise apartments are apartments (rental dwelling units) in rental buildings that have between three and ten levels (floors).	No additional qualifiers.
Residential	230	Residential Condominium/Townhouse (mid-rise)	Residential condominiums/townhouses are defined as ownership units that have at least one other owned unit within the same building structure. Both condominiums and townhouses are included in this land use. The studies of this land use did not identify whether the condominiums/townhouses were low-rise or high-rise.	The ITE description does not specify number of floors in this category. We recommend that we limit this category to mid-rise units of between 3 and 10 stories.
Residential	232	High-Rise Residential Condominium/Townhouse	High-rise residential condominiums/townhouses are units located in buildings that have three or more levels (floors). Both condominiums and townhouses are included in this land use.	To distinguish from the mid-rise category, we recommend that the high-rise category include buildings greater than 10 stories.
Recreational	445	Multiplex Movie Theater	A multiplex movie theater consists of audience seating, a minimum of ten screens, a lobby and a refreshment area. The development generally has one or more of the following amenities: digital sound, tiered stadium seating and moveable or expandable walls. Theaters included in this category are primarily stand-alone facilities with separate parking and dedicated driveways. All theaters in this category show only first-run movies or movies not previously seen through any other media. They may also have matinee showings.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).
Recreational	492	Health/Fitness Club	Health/fitness clubs are privately owned facilities that primarily focus on individual fitness or training. Typically they provide exercise classes, weightlifting, fitness and gymnastic equipment; spas; locker rooms; and small restaurant and snack bars. This land use may also include ancillary facilities, such as swimming pools, whirlpools, saunas, tennis, racquetball and handball courts and limited retail. These facilities are membership clubs that may allow access to the general public for a fee.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).
Institutional	565	Day Care Center	A day center is a free-standing facility where care for pre-school aged children is provided normally during the daytime hours. Day care facilities generally include classrooms, offices, eating areas and playgrounds. Some centers also provide after-school care for children.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).
Office	710	General Office Building	A general office building houses multiple tenants; it is a location where affairs of businesses, commercial or industrial organizations, or professional persons or firms are conducted. An office building or buildings may contain a mixture of tenants including professional services; insurance companies; investment brokers; and tenant services, such as a bank or savings and loan institution, a restaurant or cafeteria and service retail facilities.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).
Retail	820	Shopping Center [1]	A shopping center is an integrated group of commercial establishments that is planned, developed, owned and managed as a unit. A shopping center's composition is related to its market area in terms of size, location, and type of store. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands. [2]	We recommend that the selection of shopping centers be limited to "Neighborhood" and "Community" center classifications as defined by ITE (see definitions below). Additionally, the trip generation study should attempt to select sites that are near the average size of the neighborhood and community shopping centers identified in the study cited in footnote [1] but also reflect smaller urban retail sites as low as 10,000 square feet.
Retail	850	Supermarket	Supermarkets are free-standing retail stores selling a complete assortment of food, food preparation and wrapping materials and household cleaning items. Supermarkets may also contain the following products and services: ATMs, automobile supplies, bakeries, books and magazines, dry cleaning, floral arrangements, greeting cards, limited-service banks, photo centers, pharmacies and video rental areas. Some facilities are open 24 hours a day.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).
Services	932	High-Turnover (Sit-Down) Restaurant	This land use consists of sit-down, full-service eating establishments with turnover rates of approximately one hour or less. This type of restaurant is usually moderately priced and frequently belongs to a restaurant chain. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours per day. These restaurants typically do not take reservations. Some facilities contained within this land use may also contain a bar area for serving food and alcoholic drinks.	Does not necessarily need to be a free-standing facility (may be integrated into a mixed-use development).

[1] In the 6th Edition of Trip Generation, ITE discontinued the distinction in trip generation rate by size of shopping center. A study published in the ITE Journal found that while the trip generation rate did vary by size of center, the regression equations published in the manual did accurately reflect the variation in trip generation by size of center. See "Trip Generation Characteristics of Shopping Centers", ITE Journal, June 1996.

[2] Additional description in ITE Trip Generation (7th Edition): Shopping Centers, including neighborhood centers, community centers, regional centers and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities (e.g., ice skating rinks). The centers ranged in size from 1,700 to 2.2 million square feet of gross leasable area (GLA).

Definitions:

Neighborhood Shopping Center Provides for the sale of convenience goods (foods, drugs and sundries) and personal services (such as laundry and dry cleaning, barbering and show repairing) for day-to-day living needs of the immediate neighborhood. It is built around a supermarket as the principal tenant. In theory, the neighborhood center has a typical gross leasable area of 50,000 square feet; in practice it may range in size from 10,000 to 100,000 square feet.

1. San Francisco Bay Area (including Santa Cruz/Monterey Bay area)
2. Sacramento Area
3. Los Angeles Area
4. San Diego Area

- Geographic Distribution of Study Sites

Selection criteria: The proportion of population and employment within the census block groups that meet the UIA criteria will be used to allocate the regional distribution of study sites to individual counties within each region. The selection of study areas within cities is based on two criteria:

- 1) Cities with census blocks that meet either housing or employment density criteria and mapped in Working Paper #1, and
- 2) Cities that have transit systems that meet the minimum service criteria described above (rail stations, BRT systems, and/or maximum headways of 15-minutes for at least 5 hours per day).

This selection criteria requires mapping transit lines (both rail and fixed route) that meet the minimum service criteria.

- Geographic Distribution of Study Sites by District

Selection criteria: the district (an area of contiguous census block groups) must meet the following criteria:

- 1) District is within 1/3 mile of an existing or future rail transit station, a ferry terminal served by either a bus or rail transit service, an intersection of at least two major bus routes, or within 300 feet of a bus rapid transit corridor. Transit lines must meet the headway criteria described above. It is acceptable to use the collective headways of multiple routes as long as the routes serve the same corridor for a considerable length of the corridor. This reflects corridors where people can use any route to reach any point within a significant length of the corridor.

This step involves using GIS to map the districts within the distance criteria around transit lines, then identify census block groups within these mapped districts that meet either the housing or employment minimum density criteria. The TAC will be given an opportunity to review identified districts.

## B. Preliminary Study Site Identification

Selection criteria: use aerial photography and business search capabilities (e.g., google search) to review identified census block groups and apply the following qualitative criteria:

- 1) From observation, district or census block groups are located within a compact, mixed-use, walkable urban area with good pedestrian connections within the district, to transit, and to adjacent districts, and
- 2) District contains the selected ITE land use categories, identified either through web-based search of businesses, knowledge of area, or by visual inspection in field.

Note: The TAC may also provide preliminary identification of sites through local knowledge of their jurisdictions. Sites identified by the TAC will go through the same steps above the consultant uses to identify sites.

#### C. Site Owner/Tenant Interview

The site owner or tenant interview is necessary to determine the ability to obtain “population” data (needed for statistical analysis of intercept surveys) and independent variable data such as number of units, gross floor area, occupancy, etc. and to gain permission to conduct intercept surveys. The consultant will contact the owner or major tenant of the site and provide an initial interview to 1) gain permission to conduct intercept surveys and gather data about the site, and 2) ensure critical information is available to conduct a study of the site. The initial interview will be followed up with a detailed survey requesting additional data about the site and independent variables. The minimum independent variable data that must be available includes:

- Gross floor area (GFA), and occupied floor area for commercial properties.
- Number of staff and number of students at day care centers.
- Number of screens at multi-plex movie theaters.
- Number of units, and number of occupied units for residential properties.

Based on the owner/tenant interview, the site may be eliminated and review of alternative sites may be required.

#### E. Finalize Study Site Selection

Final selection of study sites (including TAC review and agreement) occurs when the site meets the criteria described in sections A through D above. A checklist will be developed to ensure criteria is met.

## **VII. Data Collection Methodology (Intercept Surveys)**

#### A. Develop Schedule and Staffing Plan for Each Site

The purpose of the site data collection plan is to ensure that the appropriate resources are scheduled to collect data within the specified timeframes. The plan will include a schedule and identify the consultant staff person responsible for organizing the data collection, collecting independent variable data and additional site data, and managing the traffic counting subcontractor.

#### B. Develop Quality Control Plan

The purpose of the quality control plan is to identify staff responsible for reviewing individual site data collection plans, data collection, independent variable information, and additional site information. Quality control is conducted by someone not directly involved in the study. The quality control reviewer is responsible for the checking the data collection methodology and the collected data against the checklist developed above. The quality control reviewer will also check data for reasonableness.

### C. Conduct Intercept Surveys

**Objective:** Use random intercept surveys to collect travel information from users of urban land uses in the derivation of automobile trip generation rates for the peak hours of adjacent street traffic. Initially, a pilot survey of between 5 and 10 sites will be conducted to test the effectiveness of the intercept survey method and to refine subsequent surveys.

**Overall methodology:** Intercept surveys collect data from a sample of the “population”. Sampling is intended to represent the population of interest, in this case the travelers who access a particular land use. The sampling procedure that assures that each element in the population has an equal chance of being selected is referred to as simple random sampling. The results of surveying a sample of the population can be applied to the total population. For example, if 60% of the sample drove alone to the site we could apply this finding to the entire population.

Sampling through intercept surveys requires that we know how many people are in the “population” and how accurate the results should be (see Statistical Confidence below). A survey of a portion of a population always has some margin of error in the results, but when the margin of error is reduced to just a few percentage points, it often becomes of little concern. A rule of thumb is to target a 95% confidence with a 5% error level, but we may not be able to achieve this high a level. The confidence tells us how confident we are about the error level. Expressed as a percentage, it is the same as saying if we were to conduct the survey multiple times, how often would you expect to get similar results.

Determining a sample size to achieve a desired confidence and error level requires that we know the size of our population. For example, if the population is 300 persons travel to/from a land use in the peak hour we would need to survey 168 persons to achieve a 95% confidence with a 5% error level, or 143 persons to achieve a 90% confidence with a 5% error level. Because we may not know the size of population in advance, we would need to collect population information at the time of the survey as discussed below.

**Data collection periods and Rate Derivation:** The intercept survey is intended to provide data to compute trip generation rates for the peak hour of adjacent street traffic (7:00 to 9:00 AM and 4:00 to 6:00 PM). This is most common rate used by transportation planners and traffic engineers. Intercept surveys can also be used to compute the peak hour of the generator, but is typically only used for special generators such as theaters, theme parks, and other large venues. The use of intercept surveys will not provide enough information to develop average daily trip generations rates because it is not feasible to collect data for a 24-hour period. Average daily trip

generation may be estimated from peak hour data by dividing by a peak to daily factor, but its accuracy would be questionable.

**Data requirements:** The intercept survey and associated data collection includes the following information for each surveyed site:

Population size: Since our objective to determine how many automobile trips are being generated and using mode share information to determine this number, the population is the number of people accessing a site during the study period. This information would be collected in different ways, but the primary way would be to count the people entering and exiting the site during the survey periods. Therefore the sites selected require that we can survey each individual entrance point to capture the entire population.

Random sampling of population: The intercept surveys will ask specific questions of the random sample of people accessing the site during the study period (see draft questionnaire). The questions will primarily derive the mode of travel used to reach or leave the site, but additional information can be collected as well.

Independent variable: The computation of a trip generation rate requires establishing an independent variable (e.g., trips per 1,000 square feet or trips per employee). If the selected independent variable is related to the population, then that information needs to be collected at the time of survey. For example, if the independent variable was employees, we would need to know how many employees were present on the day of the survey. It is desirable to use a fixed independent variable such as square feet of building area to avoid variability. We will select the most common independent variables used in the ITE Trip Generation Manual.

**Conducting the pilot surveys:**

- 1) The methodology is based on the use of a professional surveying firm to conduct the intercept surveys (pilot studies will be conducted by Gene Bregman Associates, San Francisco).
  - The pilot surveys will be conducted on a Tuesday, Wednesday or Thursday of the week of May 29 through June 2. The surveys will be conducted from 7:00 a.m. to 9:00 a.m. and from 4:00 p.m. to 6:00 p.m. Each completed survey will contain the time of arrival or departure.
  - We have established a quota of a minimum of 100 completed surveys per site and will continue the surveys each day until the minimum quota is reached. Low generation land uses such as day care centers may have a lower quota because it may not be possible to collect the minimum. ITE recommends a minimum of 100 surveys when conducting multi-use development intercept interviews.
  - One or two surveyors will ask people entering and exiting the site to fill out a short questionnaire and hand them a clipboard with a one-page series of questions (see draft questionnaire in Attachment 2). The questionnaire incl
  - KHA will arrange to have additional persons count every person entering and exiting the site from all access points.

- 2) KHA will contact the candidate sites prior to the surveys to gain permission to conduct surveys and ensure that additional independent variable information can be collected.

E. Conducting the Final Surveys

The outcome of the pilot surveys will identify issues, problems, and additional data collection requirements for completing the full set of surveys. The consultant team will use the pilot surveys to refine the methodology. After refining the survey methodology, the remaining sites will be selected and additional surveys will be scheduled and conducted.

F. Quality Review

Essentially, quality review is a second look at the data. In addition to review by the staff responsible for data collection, the quality control reviewer examines the collected data focusing on identifying missing and inconsistent data, and obvious anomalies.

## **VIII. Data Analysis Methodology**

A. Select Independent Variable(s) for Rate Calculation

The selection of independent variables to be used in calculating rates will be consistent with the variables used in the ITE Trip Generation Manual (7<sup>th</sup> Edition). The minimum independent variable data required is listed in Section VI.C above. This information would be collected in the preliminary data collection (owner/tenant interview) prior to the collection of traffic data. Should the owner/tenant of the site be unwilling to disclose the required minimum information, the site will be discarded.

B. Determine Time Period for Computation of Rates

Trip generation rates will be computed for the “peak hour of adjacent street traffic”. This is the most common time period published in the ITE Trip Generation Manual. These periods will be one hour between the time of 7:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m.

C. Compute Urban Infill Trip Generation Rates for Peak Hours of Adjacent Street Traffic

The steps for computing and evaluating trip generation rates are outlined below.

- Compute trip generation rate for each site for each time period (AM and PM peak)

Equation:  $\sum \text{Peak Hour Trip Ends}^* / \sum \text{Independent Variable Units}$

\* Peak hour trip ends will be derived from the intercept surveys as described in Section VII.C above.

- Determine inbound and outbound percentage for each peak hour

Equations:            Inbound Trip Ends\*\* /  $\sum$  Inbound + Outbound Trip Ends  
                          Outbound Trip Ends\*\* /  $\sum$  Inbound + Outbound Trip Ends

\*\* Inbound and outbound trip ends will be derived from entry counts as described in Section VII.C above.

- Compute weighted average rate for all sites [This will not be done for the pilot studies]

Equation:  $\sum$  Trip Ends for All Sites /  $\sum$  Independent Variable Units for All Sites

- Compute standard deviation using standard statistical methods (e.g.,  $S = \sqrt{\{ [\sum X^2 - (\sum X)^2 / n] / (n-1) \}}$ )
- Compute the correlation coefficient (R) and coefficient of determination ( $R^2$ ) using standard statistical methods (e.g., least squares method)
- Develop regression equation (if  $R^2 \geq 0.50$ )
- Prepare scatter plots of trips versus independent variable

#### C.     Quality Review

In addition to review by the staff responsible for data analysis, the quality control reviewer examines the trip generation and statistical computations to ensure correct formulae are used and calculations are correct.

#### D.     Compare Computed Rates to ITE Rates for Similar Land Use Categories

Computed trip generation rates will be compared to ITE published rates for the same land use categories in a comparative matrix.

#### E.     Develop Data Summary Report

The data collection plans, collected data, and analysis described above will be consolidated and summarized in a Draft Data Summary Report and associated technical appendices. Additional data in the report will include a general description of the site and surrounding neighborhood characteristics, as well as a summary of transportation access to the site. The report will be distributed to the TAC for review.

## ATTACHMENT 1

### Draft Questionnaire

What primary means of travel did you use to either get here or leave here today?

- Drove alone
- Drove others: How many including yourself \_\_\_\_\_
- Rode as passenger, car parked nearby
- Rode as passenger: dropped off
- Bus
- Rail (BART, Muni, Caltrain)
- Bicycle
- Walk
- Taxi
- Other \_\_\_\_\_

Is this location your primary destination or did you stop here on the way to another destination?

- Primary destination
- Stopped here on the way to another destination

If this location was NOT your primary destination, would you have passed by this location if you did not stop here today?

- Yes
- No

Is this your place of employment or residence?

- Yes
- No

How often do you visit this location in a typical week? \_\_\_\_\_

If you are arriving, approximately how long did it take you to get here today? \_\_\_\_\_ (minutes)

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#### **Optional Respondent Information:**

What is the zip code of your home address? \_\_\_\_\_

What is your age? (circle one)

- |                      |                |                     |                |
|----------------------|----------------|---------------------|----------------|
| 1. 18 years or under | 2. 19-14 years | 3. 25-34 years      | 4. 35-44 years |
| 5. 45-54 years       | 6. 55-64 years | 7. 65 years or more |                |

- Male
- Female

How many autos, pickups, vans and motorcycles are available for use by members of your household? \_\_\_\_\_ (enter number)

What is your occupation?

- Professional/technical
- Manager/administrator
- Sales/account representative
- Secretarial/clerical
- Student/intern
- Service worker
- Craftsman/mechanic

Including yourself, how many people live in your household? \_\_\_\_\_ (enter number)

Are you a full-time employee or part-time employee? (circle one)

What is your approximate household income?

- 0-\$20,000
- \$20,000 - \$40,000
- \$40,000 - \$60,000
- \$60,000 - \$80,000
- Greater than \$80,000

If you are employed, does your employer offer any of the following? (check all that apply)

- Flexible work hours
- Transit allowance
- Provide a company car for midday use
- Free parking

**ATTCHMENT 2**  
**INSTITUTE OF TRANSPORTATION ENGINEERS'**  
**AREA TYPE DEFINITIONS**  
**Parking Generation, 3<sup>rd</sup> Edition**

Urban locations are comprised of one of the three area types:

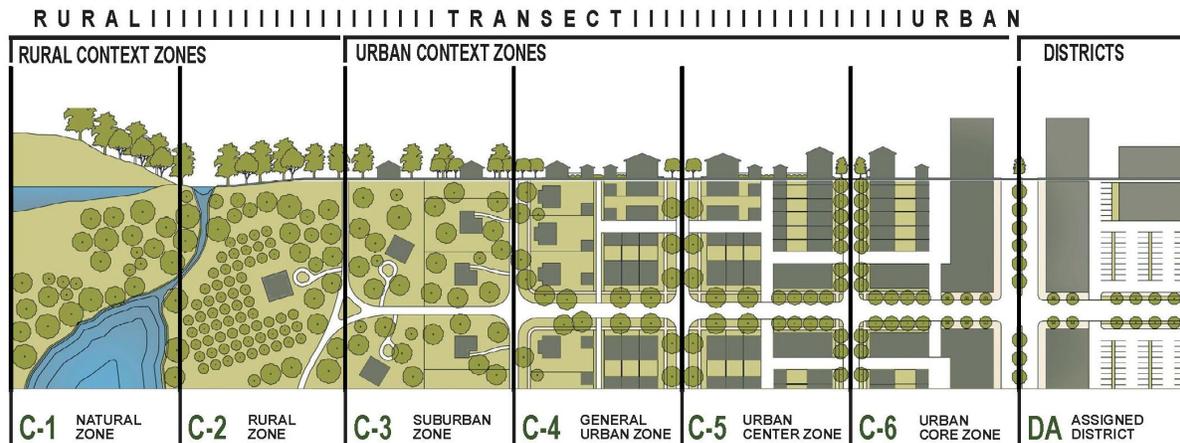
**Central Business District (CBD)** is the downtown area for a city. CBD characteristics include good transit service, parking garages, shared parking, and extensive pedestrian sidewalk network, multi-storied buildings, priced parking and a wide range of land uses (including mixed-use sites).

**Central City, Not Downtown (CND)** is the area outside the downtown area of a larger city. This area has greater land use density than suburban sites but is substantially less dense than the CBD. The intent of this area designation is for the areas around large central cities (for example, Seattle, San Francisco, Oakland, Atlanta, or Washington DC) where travel characteristics are likely to be unlike suburban conditions.

**Suburban Center (SBC)** areas are those downtown areas of suburbs that have developed CBD characteristics but are not the central city of a metropolitan region. These activity centers have characteristics that may include good transit service, a mix of surface and structured parking, connected streets, a connected pedestrian network and a mix of land uses. Examples include the downtown areas of Bellevue, WA; Las Colinas, TX; and Walnut Creek, CA.

**ATTACHMENT 3**  
**CONTEXT ZONE CHARACTERISTICS**  
**Context Sensitive Solutions in Designing Major Urban Thoroughfares for**  
**Walkable Communities, Institute of Transportation Engineers Proposed Recommended**  
**Practice (est. February 2006)**

A wide variety of factors create context in the urban environment. Every thoroughfare has an immediate physical context created by buildings and activities on adjacent properties, and is also part of a broader context created by the surrounding neighborhood or district. While the elements of context relating to buildings, landscape, land uses, and public facilities can combine in almost infinite varieties, a set of four context zones serve to define urban areas. The four context zones are a subset of a more inclusive system of contexts that can be used to describe the full range of environments from natural to highly urbanized. The figure below illustrates this concept through a diagram. Although the diagram graphically represents context zones as a linear continuum from most natural to most urban, in fact the zones are most frequently found arranged in mosaic-like patterns reflecting the complexity of metropolitan regions.



CREDIT: DUANY PLATER-ZYBERK & COMPANY

Many communities have found that context zones are useful in presenting information to the public. Local illustration of context zone examples can offer useful models that aid stakeholders in expressing their desires to create distinctive parts of their communities.

**Selecting a Context Zone**

Context is defined by multiple parameters, including land use, density, and design features. The following table presents the full range of context zones, but focuses on the suburban through urban core contexts (C-3 through C-6) representing urban conditions. The “distinguishing characteristics” column in the table, for example, describes the overall relationship between buildings and landscape that contribute to context. In addition to the distinguishing characteristics and general character, four attributes assist the practitioner in identifying a context zone:

- 1) building placement - how buildings are oriented and set back in relation to the thoroughfare,

- 2) frontage type – what part of the site or building fronts onto the thoroughfare,
- 3) typical building height, and
- 4) type of public open space.

Guidelines for identifying and selecting a context zone include:

1. Consider both the existing conditions and the plans for the future, recognizing that thoroughfares often last longer than adjacent buildings.
2. Assess area plans and review general, comprehensive, and specific plans, zoning codes, and community goals and objectives. These often provide detailed guidance on the vision for the area.
3. Compare the area's predominant land use patterns, building types, and land uses to the characteristics presented in the following table.
4. Pay particular attention to residential densities, commercial floor area ratios, and building heights.
5. If an area or corridor has a diversity of characteristics that could fall under multiple context zones, consider dividing the area into two or more context zones.
6. Identify current levels of pedestrian and transit activity, or estimate future levels based on the type, mix, and proximity of land uses. This is a strong indicator of urban context.
7. Consider the area's existing and future characteristics beyond the thoroughfare under design, possibly extending consideration to include entire neighborhoods or districts.

### Context Zone Characteristics

	A	B	C	D	E	F	G
	Context Zone	Summary Character	Building Setback/Build To and Frontage	Thoroughfare Network Scale	Building Height	Land Use Mix	Public Open Space Type
1	NATURAL (CZ-1)	Natural	Not Applicable	Regional to State Scale	Not Applicable	Restricted protected natural open space	Natural
2	RURAL (CZ-2)	Agricultural and landscaped, no pedestrians	Large setbacks porch, fence, & work yard	Regional Scale	1 to 2 story with some taller work buildings	Restricted agriculture, limited support residential and commercial	Agricultural
3	SUBURBAN (CZ-3)	Landscaped, few pedestrians, detached buildings widely separated	Deep yard setbacks dominant landscaped character (fence/hedge, yard, & porch)	Predominantly Neighborhood Scale	1 to 2 story with some 3 story	Restricted residential with "at-home" businesses and limited commercial, institutional/civic, and open space	Parks with adjacency to greenbelts
4	GENERAL URBAN (CZ-4)	Urban, pedestrians present, balanced landscape and predominantly detached buildings	Medium yard setbacks balanced landscape and building character (fence/hedge, yard, & porch)	Neighborhood to Regional Scale	2 to 3 story with some 1 story and some above 3 story; and few taller work buildings	Limited medium-density residential with limited mix of other uses typically ground level - institutional/civic, commercial, and open space	Parks
5	URBAN CENTER (CZ-5)	Urban, substantial pedestrian activity, predominantly built with attached buildings with most landscape within the thoroughfare right-of-way	Small or no setback, build to lines common, building character defining street wall (storefront, stoop, & forecourt)	Neighborhood to Regional Scale	3 to 5 story with some lower and few taller buildings	Open higher-density commercial, employment, and residential use with support institutional/civic and open space	Parks, plazas and squares
6	URBAN CORE (CZ-6)	Urban, most pedestrian activity, predominantly built with attached buildings providing a strong sense of enclosure with some landscape within the thoroughfare right-of-way	Small or no setback, build to line at sidewalk/RW, building character defining street wall (storefront, stoop, & forecourt)	Neighborhood to Sector Scale	4+ story with few lower buildings	Open highest-density commercial, employment, and residential use with support institutional/civic and open space	Parks, plazas and squares

