Guidelines on Using California Land Use/Transportation Planning Tools

1. Selecting "Ds Analysis Modules" Appropriate to a Region

In almost all cases, the appropriate "Ds Analysis Module" to use for analysis in a California region is the one that was developed for that area:

- **Sacramento region** – use the *SACOG* Ds Analysis Modules
- **San Diego region** – use the *SANDAG* Ds Analysis Modules
- **San Joaquin Valley** -- the eight MPOs in the San Joaquin Valley use the *Small-Medium Size MPOs Modules*, with the San Joaquin Valley variable set to 1.
- Areas in the **Northern Sacramento Valley, Central Coast, and Inland Empire** use the *Small-Medium Sized MPOs Modules,* with the San Joaquin Valley variable set to 0.
- Areas near rail corridors of the San Francisco Bay Area (including appropriate "Priority Development Areas") – use the *Bay Area rail corridors* analytical methods.

Using another region's Ds: In some situations, a planning process may anticipate substantial changes over time that would place the area in a different planning context. These could involve significant: transportation infrastructure and services changes; travel incentives or demand management programs; and/or land use changes beyond those found in that area when this study's data was collected (e.g., during the 2000s). Such changes may expose travelers in the area to different options, incentives and disincentives than were present when the travel surveys were conducted upon which the Ds Analysis Modules were based.

For example, the San Joaquin COG (SJCOG) may anticipate that year 2035 conditions in its region will include a light rail transit network and downtown densities similar to those in Sacramento. In this case, SJCOG may elect to use the SACOG module. Or, San Diego may foresee 2040 conditions in which its rail system becomes as comprehensive as in the S.F. Bay Area, accompanied by similar densities, cordon tolls, and parking pricing. In this case, San Diego may "opt" to use the S.F. Bay Area rail corridors equations for those specific areas.

However, using a Ds analysis module from another region should only occur <u>if</u> the borrowing area's future characteristics will be more similar to the present (approximately 2010) characteristics of the "donor" region than to the present characteristics in its own region regarding:

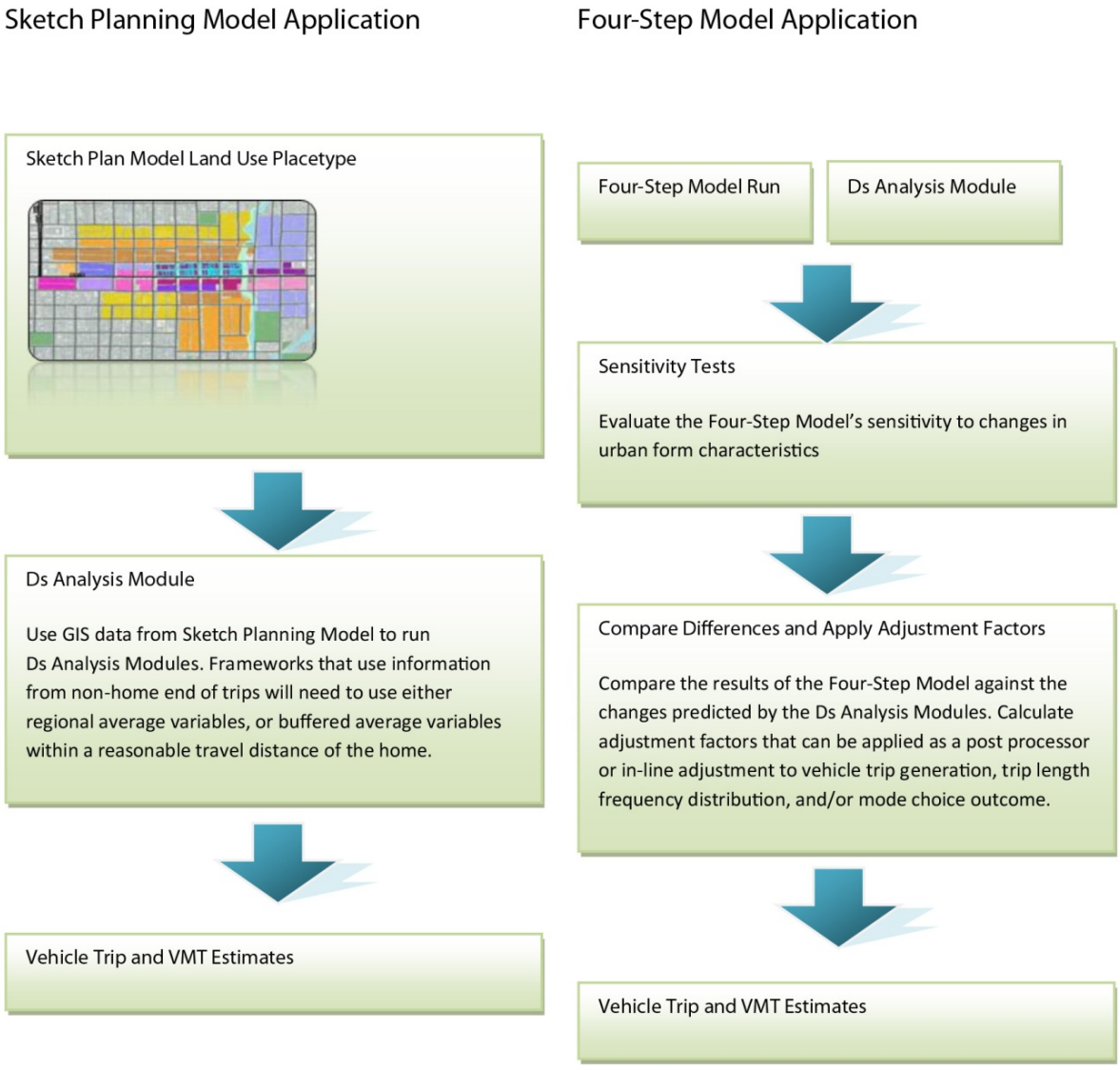
- Average region-wide development density, *and*
- Downtown core development density, *and*
- Downtown core parking prices, *and*
- Roadway pricing per freeway mile, *and*
- Region-wide rail miles per capita.

If these conditions are <u>not</u> met, then an area should use the Ds Analysis Modules that were specifically developed for its region (listed above) **rather than for another region.**

2. Selecting "2- Step" vs. "3-Step" Ds Analysis Modules

The Ds Analysis Modules (described in Appendix D) have the flexibility to be applied under several circumstances. The flowcharts in the Figure below highlight two possibilities -- for "sketch" and scenario planning; and with four-step travel demand forecasting (TDF) models, respectively:

Figure: Use of "Ds Analysis Modules" in: Sketch-Planning Tools; and with Travel Demand Models -



3. Distinction between Ds Analysis Modules and Project-Scale Tools

The built environment relationships equations developed in this project are intended for regional or large-scale scenario planning processes, such as development or evaluation of a regional Blueprint or Sustainable Communities Strategies plan, jurisdiction General Plan, or large specific community plan (200 acres or large in size).

Application of the Ds equations at a site project level should be undertaken only with considerable caution. Considerations in testing/comparing the Ds Analysis Modules to project-scale analysis tools (such as CalEEMod, U.S. EPA's MXD, Urbemis, ITE trip-generation rates, etc.) should recognize that:

- The Ds Analysis Modules are tailored for accurate prediction of impacts of regional concern, including regional VMT and total regional linked vehicle trips and tours by mode, rather than the number of vehicle trips entering and exiting a specific development site and affecting local street intersections.
- The Ds Analysis Modules focus on households as the primary generator of travel and account for all travel conducted by the household, including non-home-based (NHB) trips and VMT.
- The Ds Analysis Modules are designed to adjust regional travel model estimates by accounting for effects not well-captured in the models, and they move trip generation up or down from the generic average regional conditions represented in the model's trip rates. (CalEEMod, Urbemis and MXD are designed to adjust ITE trip generation rates, which generally reflect suburban conditions.) The quantification of discounts operates on a different assumption of the source of the base estimate and therefore the factors and quantities are not directly transferrable.
- The Ds Analysis Modules focus on broader measurements of land use type and context, such as population and employment, over a larger sampling area that accounts both for the "project" and its context. Depending on Ds Analysis Module, this is a minimum of a quarter-mile (125 acres) or half-mile radius (500 acres), with a travel shed that relates directly to trip-making relationships (walking distance, biking distance, transit access distance, school-shed distance) when examined from a regional perspective. This contrasts with highly variable project size used for site-specific traffic analysis, with an artificial cut-off point (the project boundary) defining what represents a trip and a measureable VMT.
- The Ds Analysis Modules consider the regional or sub-regional balances of jobs/housing, shopping, and recreational opportunities and account for the impacts of imbalances explicitly, while tools like Urbemis and CalEEMod do not account for broad scale imbalances. The Ds research and resulting analysis modules take such balances into consideration, and are therefore most attuned to performing analysis of regional plans, such as SCS; or citywide plans, including General Plans; or large specific plans where sub-regional and regional balances can be checked and maintained.
- The Ds Analysis Modules account for more household demographic factors than most project-specific analysis, including: family size, income, and vehicle ownership, but in less detail on characteristics of non-residential land uses of individual projects. ITE-based tools such as CalEEMod and Urbemis distinguish fast food restaurants from quality restaurants, discount retail from life-style shopping, company headquarters offices from multi-tenant or medical offices, and they account for specific numbers of movie theater screens, hospital beds, hotel rooms, etc. They are designed to conduct as detailed accounting as possible of the number of vehicle trips entering a discrete project boundary based on a precise accounting of over 150 specific land use types.

- The Ds Analysis Modules do not directly account for project-specific TDM measures such as employer commute reduction programs, parking pricing, telecommute, regional pricing, and other traveler incentives and disincentives in the explicit terms employed in CalEEMod and Urbemis.
- The Ds Analysis Modules interact with a regional travel model to account for project-specific changes in regional accessibility and the quality of transit availability. And, they account for regionally-specific trip lengths for VMT calculation rather than using generic values for trip length, or no accounting for trip length and VMT at all.

4. Relationship between Ds Analysis Modules and Elasticities

The statistical relationships identified in this study are intended to be used in the form described in this report, as two-step or three-step sequences of logistic or regression equations. "Elasticities" derived from these modules are presented for the purpose of comparing this study's findings to those of other published research on the effects of "D" variables on vehicle travel -- not as a recommended method of applying this study's results.

In cases where elasticities are the *only* feasible means of implementing built environment sensitivities in a planning process, the following items should be taken into consideration before applying "D" elasticities presented in this report in place of the recommended several-step equation modules:

- Elasticities derived from the "D" equations were used to show that they are consistent with the results other research, but tailored for California regions. They can also be used to show how elasticities computed from testing MPO models compare with this study's research-based elasticities for the region. However, the most reliable means of operationalizing the "D" equations is as several-step multi-variable equations rather than as a series of elasticity applications.
- Application of elasticities requires application of boundary controls to prevent large changes in independent variations from producing exorbitant changes in dependent variables. The well-populated difference ranges in independent variable over which the elasticity values were derived do not allow for stable application over increases in a variable by a substantial percentage (say a 400% increase in density). Testing is needed to determine reasonable maximum and minimum elasticity effects and reasonable floor and ceiling constraints on net changes in independent variables and/or floor and ceiling values on dependent variables (such as the minimum and maximum VMT per household presently found in the region).
- Applying a series of elasticities requires controlling for compounding effects. Using the elasticities in isolation creates the potential for sequential factoring of the dependent variable by relatively large effects, even though the individual "D" variables naturally work in concert with one another as in the comparisons among different "place or area types", rather than as independent "levers." Floor and ceiling effects need to be used to control the lower and upper bounds of adjusted VMT generation once all elasticities have been

applied to be sure they are within the range expected of the new built environment "place or area type" based on evidence from the lowest and highest VMT generating examples of each place or area type presently found in the region.

Please note: For additional information, refer to Appendix "D" to the Final Study Report – "Results of Analysis of Land Use & Travel Data"; and Appendix "E" – "Implementation of Ds Analysis Modules with Regional Travel Demand Models".