Induced and latent demand in the SDPTM

Induced and latent demand as observed in the real world is really a collection of a number of parallel phenomena. If, for example, a new freeway is built, the travellers on the road will have come from a number of sources. Some may be making the same trip, but choosing a more convenient route. Some may have switched modes to auto from transit, or to SOV from HOV. Some may have changed their choice of a destination to one that is conveniently accessed from the freeway. And still others may be making a trip they may not otherwise have made – such as an additional leisure trip, or a worker going home for lunch instead of eating in the cafeteria.

The Short Distance Personal Travel Model (SDPTM) reflects all of these dimensions that create the induced demand effect, including the generation of more or less travel in response to transportation or land use changes. One key aspect of this is the addition of a more elastic Daily Activity Pattern module as part of the 2013 CSTDM improvements, which has many more ties between transportation / land use conditions and generated activities, as detailed below.

To examine the induced demand responses of the SPDTM, an example situation will be considered; a new highway project improving capacity between two cities along a corridor. This is an example project; other possible scenarios may have different effects (a transit project may reduce auto ownership, for example, while still increasing accessibility along a corridor; a denser land use scenario may also have increased accessibility, but produce shorter trips). The expected responses from this scenario can produce examples of induced demand on a number of dimensions; the most major are summarized below. There are often interactions, particularly since all of the models respond in some way to transportation and land use changes and also use the decisions made in earlier models – a model may respond both directly to accessibility and indirectly through a decision on auto ownership made previously, for instance.

Long Term Decision Models:

- Driver's License: Higher rate of driver's licenses along corridor as auto accessibility increases (particularly relative to non-auto accessibility).
- Auto Ownership: Higher auto ownership along corridor as auto accessibility increases (particularly relative to non-auto accessibility).
- Work at Home: Fewer workers work at home due to higher overall work accessibility.
- Work and School Location: Workers/Students more likely to choose work/school locations along corridor, and more likely to choose auto-accessible work/school locations.

Daily Activity Pattern Models:

- Day Role Choice: Reduction in no travel days due to increase in auto ownership; nonworking adults more likely to travel due to increased accessibility. Workers (and grade school students) have a more complex interrelationship -- if they choose to go to work in the same location,

they are more likely to go due to the easier travel, but as noted above, there will be a work location choice response where workers may choose to work further away along the corridor and that may result in them being less likely to travel to work on the day.

- Work Day Pattern Group: A complex interrelationship. If workers choose to work in the same location, they will tend to make more work tours and more nonwork tours. On the other hand, workers who choose to work further away along the corridor may instead be more likely to perform a single work tour, with more diversion stops on their work tour.
- School Day Pattern Group: A similar complex interrelationship to the Work Day Pattern Group choice model; to the degree that the school locations are the same but the travel is easier, that manifests in more school tours and more non-school tours. To the degree that students attend school further away from home, that tends to produce fewer tours, but more stops on the school tour. Increased auto ownership will also manifest in more travel, in terms of school tours, non-school tours and trips made.
- Other Day Pattern Group: As accessibility rises, the utility of making more tours increases, while the utility of making more stops on a given number of tours decreases. This is the same tradeoff seen in the Work Day Pattern Group Choice model. Increased auto ownership will also result in increased travel, and particularly in an increase in escort (pick up/drop off) tours.

Tour and Trip Level Models:

- Work and School Tour Mode: The mode choice will shift to auto modes, particularly along the improved corridor, due both to corridor travel improvements and increased auto ownership.
- Other Tour Mode: Auto mode choice share will increase, this also includes an interaction with auto ownership.
- Other Destination Choice: Persons more likely to choose destinations along corridor, particularly given they are also more likely to be driving.
- Secondary Destination Choice: Secondary destinations are more likely to be along corridor, particularly since more primary destinations (work, school and other) being selected along the corridor.
- Trip Mode Choice: Highly dependent on tour mode choice decisions made above, so increase in auto modes. Increase in SOV due to increased auto ownership.

Network Assignment:

- Improvements on the corridor will result in more OD pairs where the best path is to use the corridor; even if a fixed trip table (i.e. without all of the demand model responses described above) is reassigned with the corridor improvements, an increase in trips on the corridor will occur.