8.3 Estimating Bike and Walk Trip Distances

DAYSIM starts from parcel level land use inputs, and all location and destination choice models predict choices at parcel level, too. However, highway and transit networks are TAZ-based. Because of this inconsistency in spatial detail between the land use inputs and DAYSIM locations/destinations, and the highway and transit networks, an algorithm was developed to merge parcel-to-parcel distance estimates, and TAZ-to-TAZ estimates of the same. For more detail on this process, see Chapter 5 (Bike and Walk Networks). The algorithm used is:

- TRAVDIST = NWFRAC * SKIMDtaz + (1-NWFRAC)*ORTHDparcel
- Where:
    - TRAVDIST = the travel distance between parcels, adjusted
    - SKIMDtaz = TAZ-to-TAZ distance skim
    - NWFRAC = a proportion ranging from 0 to 1, computed as:
        - Min (1, SKIMDtaz / 6)
        - ORTHDparcel = the orthogonal (x+y component) distance between the parcels

Starting with parcel/points in SACSIM provides an opportunity to replace the centroid/skim representation of proximity with something more detailed and more directly based on the actual land use pattern. In theory, the best approach would be to use a street-centerline GIS file (rather than a stick-and-ball TAZ-based highway network) to find “true” proximity of one parcel to another (rather than one TAZ to another). However, this is impractical for a working travel demand model for two reasons. First, finding actual parcel-to-parcel paths using a GIS file would be prohibitive in terms of computation time. Second, in many cases specific street patterns for future land uses are not known in the present, and some treatment of street access to future developments would need to be created.

SACSIM computes two measures of proximity at parcel level. One is a parcel-to-parcel orthogonal distance (the sum of the “X” and “Y” coordinate distance separating two parcels). The second is a conventional TAZ-to-TAZ distance skim, comparable to skims for four-step, TAZ-based models. Based on orthogonal distance estimate, the two measures of proximity are formulaically combined. For parcels which are closer, the parcel-to-parcel distance is weighted heavily; for parcels which are very distant, the TAZ-to-TAZ distance skim is weighted heavily. By using this combined approach, unique measures of parcel-to-parcel distance are computed, which reflect the “true” proximity to a greater degree than do TAZ-to-TAZ skims alone.