8.2 Building Bike and Walk Skims

8.2.1 Building Bike and Walk Paths for Skims

Separate TAZ-to-TAZ distance skims are prepared for walk modes, which include the following features:

- Bike and walk links are included in path building
- All surfaces streets are included in path building
- Reverse direction on one-way streets are allowed
- Ramps and freeways are excluded.

8.2.2 Effect of Bike Facility Type

Research has shown that bicyclists have unique route preferences and aversions, based route characteristics such as presence or absence of a bike lane and traffic volumes[10,11]. SACSIM attempts to model these preferences, based on the type of bicycle facility coded and the traffic volume (if any) on the link. The adjustment to distance is scaled to reflect the level of preference (indicated by an adjustment factor < 1.0—effectively "shortening" the perceived distance on the link) or aversion (indicated by an adjustment factor >1.0—effectively "lengthening" the perceived distance on the link). Table 8-1 Distance Adjustment Factors for Skimming Bicycle Facilities summarizes how these preferences are represented in SACSIM. In general, the assumptions for preferences are:

- Bicyclists prefer exclusive, Class 1 bicycle facilities where available and will travel extra distance to use them.
    - The distance adjustment factor sets this preference at 16 percent—i.e. a cyclist might travel 16 percent further in order to use Class 1 bicycle facility, compared to a shared roadway.
- If exclusive, Class 1 facilities are not available, bicyclists prefer roadways with lower vehicle volumes.
    - The aversive effect of higher volumes increases with increasing volumes. For example, roadways with about 12,000 daily vehicles are perceived as being 13 percent longer than a low volume roadway, but a roadway with 60,000 or more vehicle is perceived as being 150 percent longer.
    - Looked at the other way, a bicyclist might travel 150 percent extra distance in order to avoid a high volume roadway with no bike lane.
- If a Class 2 bike lane is provided, the aversive effect of higher vehicle volumes on a roadway is somewhat reduced.
    - For example, while a bicyclist might travel 150 percent extra distance to avoid a roadway with 60,000 vehicles and NO bicycle lane, they might travel 100 percent extra distance to avoid the same roadway WITH a Class 2 bike lane.
- Bicyclists avoid routes which take them on surface streets crossing freeways, with ramp intersections on the surface street, and will travel significant extra distance to avoid these facilities.
    - This factor was NOT explicitly researched in any study used by SACOG for establishing this process for path-building—it was generated by SACOG staff based on anecdotal evidence, and application of well researched factors like slope.

[10] Broach, Joseph, et al, "Bicycle Route Choice Model Developed Using Revealed Preference GPS Data", Portland State University, November 2010.

[11] Charlton, et al, "Bicycle Route Choice Data Collection using GPS-Enabled Smartphones", San Francisco Transportation Authority, 2010.

Bicycle TAZ-to-TAZ skims are then built from the adjusted distance. In all cases, the true distance is skimmed, but the paths are built using the adjusted distance. Five different skim values are skimmed. The first value is the end-to-end distance—each of the four subsequent values area portions of the total end-to-end distance:

- The total TAZ-to-TAZ true distance;
- The distance on Class 1 bicycle lanes;
- The distance on Class 2 bicycle lanes;
- The distance on BIKE="8" links; and
- The distance on BIKE="9" links.

Table 8-1 Distance Adjustment Factors for Skimming Bicycle Facilities

	"BIKE" Link Coding‡					
Daily Vehicle Volume†	0	1	2	3	8	9
< 2,000	1.00	0.84	0.90	1.00	1.10	1.00
6,000	1.00	n/a	0.90	1.00	1.10	1.00
12,000	1.13	n/a	0.95	1.07	1.35	1.18
30,000	1.87	n/a	1.28	1.51	2.74	2.14
60,000+	2.50	n/a	1.50	2.00	4.00	3.00

Source: SACOG 2020.
Note: Distance adjustment factors used to scale actual link distance in SACSIM19 networks—e.g. "0.84" translates to a 16 percent reduction (shortening) of link distance; "1.50" translates to a 50 percent increase of link distance.
Daily vehicle volume is total (i.e. both directions for 2-way roads) and is drawn from the highway assignment results for each iteration of SACSIM19. Distance adjustment factors are computed from volumes—shown on this table are a few key points.
"BIKE" codes are described in detail in Chapter 3. "0"= no bike facility; "1" = Class 1 (exclusive bicycle lane); "2" = Class 2; "3" = Class 3; "8" = surface street at freeway interchange with NO bicycle lane; "9" = same as "8" but with Class 2 lane.