



MEMORANDUM

To: Working Committees

From: CMAP Staff

Date: September 2013

Re: Facility design quality criterion for Transportation Alternatives Program

The “safety and attractiveness rating” is a measure of bicycle and pedestrian facility design characteristics, evaluated for both existing conditions and proposed projects. Using this straightforward measure, projects can be compared against each other in terms of their expected benefit for non-motorized travelers. It has been used for project evaluation for CMAP’s [Congestion Mitigation and Air Quality Improvement Program](#) (CMAQ). It is proposed that this measure also be used in the evaluation of facility design quality in the new Transportation Alternatives program.

First developed by the CMAP [Bicycle and Pedestrian Task Force](#), the safety and attractiveness measure revolves around the concepts of the “level of accommodation” in a bicycle/pedestrian facility and, for on-street facilities, the functional class of the roadway. The goal of the Bicycle and Pedestrian Task Force was to promote mode shift from automobile travel to nonmotorized modes. Bicyclists prefer higher levels of accommodation. Though count data do not offer definitive proof of a relationship, bike counts in the City of Chicago show increased bicycling as facility improvements have been implemented over the past several years.¹ More rigorous research also bears this out. For example, Tilahun, Levinson, and Krizek provide evidence of a preference for off-road facilities, followed by bike lanes, followed in turn by riding in traffic.²

For the safety and attractiveness rating, the following concepts of accommodation are employed:

- A barrier is identified where there is no physical facility, either a road or designated trail, for a bicyclist to legally use in going from one location to another. This is usually defined by applying to a 0.5-mile buffer around the facility.

¹ David Smith, presentation to the CMAP Bicycle and Pedestrian Task Force, May, 2013.

² Tilahun, Nebiyu, David Levinson, and Kevin Krizek. “Trails, Lanes, or Traffic: The Value of Different Bicycle Facilities Using an Adaptive Stated Preference Survey.” *Transportation Research A: Policy and Practice*. 41(4) (May, 2007). Pp. 287-301.

- Where roadways are available for travel, “no accommodation” is defined as a roadway with no designated bicycle facility and no wide paved shoulder (at least four- or five-foot-wide, depending on the circumstances).³ On roads with no accommodations, bicycles use general-purpose travel lanes. For bicycles, five-foot-wide sidewalks do not offer accommodation (and are often illegal for bicyclists to use, particularly in commercial areas).
- Roads with “some accommodation” would include arterial roads with paved shoulders (at least four- or five-foot-wide) or marked shared lanes. Marked shared lanes are typically indicated with shared lane markings (“[sharrows](#)”).⁴ For roads with narrow lanes, this level of accommodation may also be indicated by “Bicycles May Use Full Lane” signs.⁵ Lastly, some highways have incomplete non-standard bike lane installations or purpose-built unmarked shared lanes wider than twelve-feet; such accommodations would also be considered “some accommodation.”
- “Full accommodation” indicates a bicycle facility separated or protected from moving motorized traffic (though these facilities typically cross other highways and driveways). Examples include separated sidepaths, cycle tracks, buffered bike lanes, and protected bike lanes. It is expected that buffered bike lanes, cycle tracks, and protected bike lanes are functionally similar to separated sidepaths, as supported by very high peak-period bicycle counts on the former facilities.

For pedestrians, the choice of facility along roadways is more limited. Here is how the measure is used for sidewalks:

- No accommodation means, simply, no sidewalk.
- “Some accommodation” means intermittent sidewalk. Such intermittent sidewalks are typically installed during the development process.
- Full accommodation means a fully developed sidewalk

For pedestrian highway crossings:

- “No accommodation” means an unmarked crosswalk.
- “Some accommodation” means a marked crosswalk.
- “Full accommodation” means a protected crosswalk, either by a full highway traffic signal, medians/pedestrian refuge islands, or a pedestrian hybrid beacon.⁶ The latter two accommodations are “proven safety countermeasures,” supported by the Federal Highway Administration.⁷

The safety and attractiveness measure also includes the concept of functional class, a grouping of roads according to the character of traffic service that they are intended to provide. Local and collector streets are usually bikeable and walkable for most of the population; adding accommodation does not improve the attractiveness of bicycling or walking very much for most

³ <http://www.bicyclinginfo.org/engineering/facilities-shoulders.cfm>.

⁴ <http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf>. Section 9C.07, p. 810.

⁵ <http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/mutcd2009r1r2edition.pdf>. Section 9B.06, p. 794.

⁶ http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_012.htm.

⁷ http://safety.fhwa.dot.gov/provencountermeasures/pc_memo.htm.

of the population. Local streets are somewhat more attractive than collector streets. In contrast, arterial roads are not typically attractive for walking and bicycling without accommodations. Arterial roads with no accommodation thus receive a low score for the safety and attractiveness ranking.

Putting the above concepts of accommodation and functional class together, the safety and attractiveness measure was developed by the CMAP Bicycle and Pedestrian Task Force as a simple technique to characterize a bicycle-pedestrian facility proposal.⁸ The group suggested that an examination of the change in bicycle or pedestrian accommodation which would occur as a result of the project was the best approach to take. The group suggested that this include a measure of the “before” conditions for cycling or walking in a project area or corridor, followed by a prospective measure of those post-project conditions. The difference between these two measures would, in turn, measure the magnitude of improvement the project would achieve.

The safety and attractiveness measure has evolved to use the following scale:

- 0: Impassable barrier for walking and bicycling;
- 1: Arterial road with no bike/ped accommodation;
- 2: Arterial road with some bike/ped accommodation, including marked shared lanes, and collector streets with no accommodation;
- 3: Low-speed, local streets with no bike/ped accommodation;
- 4: Unprotected bike lane; local and collector streets with full accommodation;
- 5: Trail or arterial sidepath, cycletrack, protected bike lane, or buffered bike lane.

The “safety and attractiveness” measure is straightforward, but its application requires understanding some nuances. For example, the “before” measures would be taken at the worst point in the corridor of the project. An impassible river barrier would be ranked “0” no matter how good the cycling infrastructure on either side of the riverbanks. Other factors which would inform the rating of both the current and “post-implementation” performance would be roadway speed, volume, the number of lanes, and lane widths. The safety and attractiveness rating typically measures conditions on the line being improved, not on cross-streets. Thus, the “before” ranking of a local street without accommodations would be 3, even if it crosses an arterial highway. Finally, if there is doubt regarding “after” conditions, the detailed cost estimate should be consulted to determine what improvements are to be included in the project.

In summary, the safety and attractiveness score is a simple technique to characterize the benefits of a bicycle-pedestrian facility proposal. It can readily be applied to the Transportation Alternatives program at CMAP.

⁸ http://www.cmap.illinois.gov/c/document_library/get_file?uuid=bc164b87-c3e9-4ecb-9f1d-f736070d48a1&groupId=20583.