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ASSESSING LEVEL OF SERVICE EQUALLY ACROSS MODES

PROBLEM STATEMENT

Transportation investments are influenced by the level of service ratings of the current and expected system performance. According to the *Highway Capacity Manual*, Level of Service (LOS) is a "quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience." LOS for a roadway facility or mode falls into six letter grade levels with "A" indicating the highest quality and "F" indicating the lowest. In the Florida Department of Transportation's (FDOT) *2002 Quality / Level of Service Handbook*, LOS for the automobile, transit, pedestrian, and bicycle modes are based on a variety of criteria and, thus, calculated on different bases. Automobile LOS is measured using average stopped delay for intersections, average speed for arterials, and density for freeway segments. Automobile LOS "F" implies traffic is at a near standstill. Bicycle LOS is a function of the typical roadway conditions, bicycle facilities, and safety perceived by users. Whereas automobile LOS "F" represents too many users, bicycle LOS "F" represents the opposite—only those who absolutely have to bike will do so, probably due to safety concerns or lack of facilities. Pedestrian LOS is similar to bicycle LOS. For fixed route transit, pedestrian LOS measures access to transit routes based on the population within walking distance to bus routes and service frequency.

Unfortunately, current classification schemes render total transportation system performance and multimodal tradeoff decisions difficult to assess. For automobile travel, most users would consider LOS "D" or "E" conditions satisfactory. However, LOS "D" or "E" for bicyclists can be poor enough to deter all but skilled bicyclists or those with no other mode choice from making a trip. Furthermore, the measures do not reflect expectations (i.e., do travelers interpret LOS "D" the same under all conditions?) or system reliability/volatility (i.e., how does LOS fluctuate over time? How sensitive is the system to disruption?).

OBJECTIVES

The primary focus of this research was to evaluate the need to develop a LOS system that can be assessed equally for motor vehicle, bicycle, pedestrian, and transit modes. If a need for a common LOS system is identified, are there methodologies that FDOT can use to develop a common LOS system? In addition to developing a common LOS system, researchers also examined how stakeholders currently use LOS measures to make decisions and how they would like to use them to make decisions in the future.

FINDINGS AND CONCLUSIONS

The need for a LOS scale that can be assessed equally across modes stems from the fact that the term "LOS" has largely become associated with assessing the capacity of roadways for motor

vehicles. However, background research illustrates that while capacity (based on delay and speed) is the primary LOS evaluation measure for motor vehicles, frequency of service is the primary evaluation measure for assessing transit, and safety and comfort are the primary evaluation measures for the bicycle and pedestrian modes. Thus, the development of a LOS score that can be applied equally across modes may not be practical without normalizing these scales in some manner. Furthermore, interviewed stakeholders indicated that there is not a problem with using the LOS terminology and scale to describe the quality of service for the transit, bike, and pedestrian modes.

In light of previous attempts to identify a means to assess LOS equally across modes, the research team decided to extract new approaches by employing a series of brainstorming/creative thinking sessions involving transportation experts and stakeholders.

The advisory committee initially expressed concern over whether assessing LOS equally across modes was desirable and/or feasible, given the different needs revealed in the current methods of measuring LOS. The committee agreed that the current levels of service are appropriate for their respective modes, understandable by broad audiences, and professionally defensible. However, after they identified the advantages and drawbacks associated with a system of measuring level of service equally across modes, the advisory committee also agreed that this system would be of significant value to policymakers, developers, and the transportation industry. In particular, the participants noted that it would give a stronger impetus to multimodal planning and that it would simplify the process for making trade-offs among modes at the local level.

The advisory committee then began the process of identifying alternative approaches to the problem. In effect, the committee began to develop a system that keeps the current LOS methods in place but that seeks to relate each mode's LOS to the other modes' LOS by establishing the relationship to user needs as a common characteristic. The advisory committee concluded that the identification of the common denominators across all the modes or users was necessary for a true method of assessing LOS equally across modes and permitting trade-offs across modes.

The advisory committee recognized that there was a need to develop a method for multimodal weighting to reach policy targets, and it recommended that the method should be flexible and be driven by policy to reflect different conditions. For example, some consideration should be given to different weighting or conversion factors based on corridor or location (i.e., the options and user trade-offs are quite different in downtown streets than roadways in remote office parks or suburban subdivisions). These target weightings should show people where the system stands today so they can communicate or determine weightings in the future.

The advisory committee also recognized that transportation system users have a hierarchy of needs that are common to all modes. Inspired by Maslow's Hierarchy of Needs, the advisory committee discussed the concept of a hierarchy of transportation system user needs. The Transportation System User Hierarchy of Needs is hypothesized to consist of five levels of needs: safety and security (the most basic need), time, social acceptance, cost, and comfort and convenience. Time savings, convenience, and other considerations are nearly meaningless if personal safety is threatened. Furthermore, safety is thought to include the degree of familiarity with mode, route, and destination. The more unfamiliar users are with a given route, for example, the greater the likelihood that they are concerned with personal security. The next most

significant need relates to travel time, which includes access time, waiting time, and in-vehicle time. The need to link trips or *trip chain* also may determine LOS from the user's perspective.

BENEFITS

One of the benefits of this research is that it will enable the Department and other organizations to better integrate the results of bicycle, pedestrian, and transit level of service with automobile level of service analysis. Further, this study has expanded the discussion of some of the possible applications of FDOT's multimodal Level of Service program.

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