

## What can average daily traffic tell me about the potential outcomes of a four- to three-lane conversion?

The primary focus of this summary is whether to further consider a four-lane undivided to three-lane (four- to three-lane) cross section conversion when only planning-level traffic volume information is available. This summary outlines the guidance applicable to scenarios where average daily traffic (ADT) is the only input for this type of decision-making.

However, ADT is just one piece of information that should be used to determine whether a four- to three-lane conversion should remain as an option for more detailed analysis. In fact, the value of ADT as an outcome measure can be very limited, and this information should only be considered as part of a first step in an assessment. The next step in the evaluation of this type of conversion should be a detailed analysis of the potential corridor operations, the importance of which is discussed below. More detailed guidance on the analysis of corridor operations can be found in various reference materials that focus on this subject and the software that might be used to complete such an analysis.

### ADT VOLUME



The Federal Highway Administration (FHWA) *Road Diet Informational Guide* (Knapp et al. 2014) provides the maximum ADT thresholds used for four- to three-lane conversions in Pasadena, California; Lansing, Michigan; and Seattle, Washington (at the time of the guide's publication). These volumes might be considered the point above which the feasibility of this type of conversion could be questionable.



Recreated from Knapp et al. 2014

Maximum ADT volumes for four- to three-lane conversions in three cities

Additional guidance offered in the *Road Diet Informational Guide* on the use of ADT includes a Kentucky study that found four- to three-lane conversions with daily volumes up to 23,000 (Stamatiadis et al. 2011). FHWA also advises that roadways with an ADT of less than 20,000 vehicles per day (vpd) should be evaluated for the feasibility of four- to three-lane conversion (Knapp et al. 2014). In addition, Iowa guidance from 2001, based on a peak hour operational analysis and a series of assumptions (see below), suggested that four- to three-lane conversions are probably feasible along roadways with an ADT at or below 15,000 vpd but are less likely to be feasible with an ADT above 17,500 vpd (Knapp et al. 2001). The guidance proposed that the feasibility of a four- to three-lane conversion be considered more cautiously along roadways with an ADT between these two (Knapp et al. 2001). In fact, the Iowa DOT, in its *Design Manual*, indicates that 15,000 to 17,500 vpd is the maximum daily volume to consider for a three-lane roadway with a two-way left-turn lane (TWLTL).

In general, the *Road Diet Informational Guide* notes that ADT can be used as a “good first approximation on whether to consider a road diet [i.e., four- to three-lane] conversion” (Knapp et al. 2014). It further states that if a roadway has an ADT that is near these upper limits, additional analysis is needed at the operational level. In other words, it is important to realize that the use of ADT as an outcome measure is a generalized planning-level consideration and does not take into account the specifics of a corridor or its peak hour/period operations (see below). The outcome of this type of conversion might be influenced by what happens during peak travel hours/periods, among many other factors, because of the large amount of activity that occurs during these times.

### PEAK HOUR/PERIOD VOLUMES



The Iowa four- to three-lane conversion guidelines from 2001 included the results of a peak hour volume sensitivity analysis of operations along a sample corridor (including several assumptions about traffic flow) (Knapp et al. 2001). This analysis concluded the following about four- to three-lane conversions:

- Probably feasible at or below 750 vehicles per hour per direction (vphpd) during the peak hour
- May be considered cautiously between 750 to 875 vphpd during the peak hour
- Feasibility less likely above 875 vphpd during the peak hour, with a reduced arterial level of service expected during the peak

It is important to note, however, that these analysis results were for an idealized corridor and were based on assumptions that 10 percent of the ADT occurred during the peak hour and that there was a 50/50 split in traffic flow. Therefore, one can also see how these results relate to the ADT suggestions above (i.e., 750 vphpd is the same as 15,000 vpd, and 875 vphpd is the same as 17,500 vpd). In other words, this guidance on peak hour volumes is limited by the same restrictions as the guidance on ADT volumes noted previously, and it is best to recognize the uniqueness of a corridor when considering operational-level analysis. More recently, however, *National Cooperative Highway Research Program (NCHRP) Report 1036: Roadway Cross-Section Reallocation: A Guide* proposed a decision-making framework and approach that might

be considered to evaluate some operational impacts for more than the peak period (Semler et al. 2023).

Many factors can influence the operation of a corridor. The national guidelines in the *Road Diet Informational Guide* (Knapp et al. 2014) discuss level of service (LOS) and quality of service, and the reader should use the *Highway Capacity Manual* (HCM) to find current operational analysis approaches (TRB 2022). The operations of a corridor before and after a conversion also depend on factors that include, but are not limited to, overall, directional, and turning volumes; access density; and signal phasing and timing. The existence of large vehicles (e.g., trucks and transit buses) may also impact corridor operations, but this factor is discussed in another summary in this series.

## SUMMARY



Overall, it is important to remember that four- to three-lane conversions have been considered successful over a wide range of ADTs and that their outcomes are often determined by a comparison the traveling public (e.g., drivers, pedestrians, and bicyclists) makes in terms of various factors before and after the change. For example, a four-lane undivided roadway already operating as a de facto three-lane roadway (e.g., with most through vehicles in the right lane due to high levels of turning traffic) is more likely to succeed than a similar roadway operating differently. The outcomes of the conversion will also be compared to the proposed, and agreed-upon, objectives/goals of the conversion. In fact, the need for a clear understanding of these objectives/goals is the subject of another summary in this series.