What are some parallel facility and treatment options that can serve pedestrians and/or bicyclists along a roadway?

A design consideration for four-lane undivided to three-lane (four- to three-lane) and other types of roadway cross section conversions is the needs of pedestrians and bicyclists. These users' needs can be met by facilities that travel parallel to and across motorized vehicular traffic flow. Design options for parallel facilities and treatments that might be used to serve pedestrians and/or bicyclists are the focus of this summary.

The Federal Highway Administration (FHWA) has identified several specific pedestrian and/or bicycle design features that could be incorporated into lane reduction conversions. These features include refuge islands, enhanced crosswalk markings, widened sidewalks, and bicycle lanes (FHWA 2018). Another document, National Cooperative Highway Research Program (NCHRP) Report 500, Volume 10, also presents pedestrian treatments and strategies (Zegeer et al. 2004).

This summary describes the implementation and characteristics of some options that are available to serve pedestrians and/or bicyclists and that might be considered as part of a cross section conversion project. The reader is referred to other summaries in this series to discover more about the potential safety impacts of sidewalks and bicycle lanes. The facilities and treatments discussed in this summary also support the concept of Complete Streets design.

FACILITIES AND TREATMENTS

The implementation and characteristics of three pedestrian and/or bicyclist facilities and treatments are briefly described below. These facilities and treatments include sidewalks, shared paths, and bicycle lanes. Some documents that can be used to help in the selection of the facility or treatment to provide are noted later in this summary.

Sidewalks

Sidewalks provide pedestrians with space to travel within a roadway right-of-way separately from vehicles. They are one of FHWA's Proven Safety Countermeasures (FHWA n.d.). These facilities provide access to various land uses and are a common consideration for lane reduction projects. The Iowa Statewide Urban Design and Specifications (SUDAS) *Design Manual* indicates that where pedestrians are present or expected in the future, consideration should be given to constructing sidewalks on both sides of a roadway to prevent future vehicle-pedestrian conflicts (SUDAS 2024).

Iowa LTAP

Sidewalks on both sides of a three-lane roadway

The SUDAS and Iowa DOT design manuals identify three types of sidewalks that are commonly used in Iowa: those beginning at the curbline and usually extending to the right-of-way line, those with the back edge of the sidewalk 1 foot or more off the right-of-way line, and those with the back edge of the sidewalk on the right-of-way line (SUDAS 2024, Iowa DOT 2019). The first type of sidewalk is commonly found in downtown/commercial areas and has varying widths. In these downtown areas, a desirable sidewalk width of 10 feet or a width sufficient to provide a proper level of service to the pedestrian volumes is desired (SUDAS 2024, Iowa DOT 2019). The last two types of sidewalks typically incorporate some type of grass or other landscaped parking area between the curbline and sidewalk itself.

Sidewalks must also meet accessibility requirements, including a minimum width of 4 feet and specific curb ramp designs per Chapter 12 of both the SUDAS and Iowa DOT design manuals (SUDAS 2024, Iowa DOT 2019). Five-foot widths, however, are used by the Iowa DOT and are encouraged. The 5 foot width better accommodates two people walking abreast. In addition, as indicated in the SUDAS and Iowa DOT design manuals, constructing sidewalks at the minimum width of 4 feet also requires the provision of passing spaces (SUDAS 2024, Iowa DOT 2019).

The dimensions of these passing spaces are 5 feet by 5 feet at a minimum, and they need to be spaced at maximum intervals of 200 feet. (The information in Chapter 12 has been based on a Proposed Rule issued by the Architectural and Transportation Barrier Compliance Board on July 26, 2011, titled Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way [commonly referred to as PROWAG], but at the time this summary was written, the content of a version published on August 8, 2023, was being evaluated for use in Iowa.)

Shared Use Paths

Shared use paths are facilities for pedestrians and bicyclists that are physically separated from vehicular traffic. This physical separation may be accomplished by a barrier system if the path is close to the travel lanes or through a grass or landscaped median if the path is set back from the roadway. The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities* notes that shared paths are designed for two-way travel (AASHTO 2012). It should also be noted that in the context of a cross section conversion project, shared paths are more likely to be employed in suburban or rural areas than in urban (downtown) or dense commercial areas.

The SUDAS and Iowa DOT design manuals both include a section on the design of shared use paths (SUDAS 2024, Iowa DOT 2019). A typical path width of 10 to 12 feet is indicated to accommodate two-way traffic, but the sections also note that wider paths (e.g., 11 to 14 feet) should be considered in some situations, for example, where user volumes are greater than 300 within the peak hour, in the presence of curves, and/or in the presence of large maintenance vehicles (SUDAS 2024, Iowa DOT 2019). Similar to sidewalks, there are also elements of shared use paths that must be designed to meet applicable accessibility requirements.

Bicycle Lanes

Bicycle lanes are facilities within a roadway cross section that are typically adjacent to vehicle lanes and provide a dedicated space for bicyclists. They are one of FHWA's Proven Safety Countermeasures (FHWA n.d.). The objective of a bicycle lane is to remove riders from vehicle traffic and allow bicyclists to travel at their preferred speed. They are typically a paved lane adjacent to a vehicle travel lane and are designated by pavement markings. A paved roadway shoulder may also sometimes be designated as a bicycle lane (AASHTO 2012).

Recent updates to the SUDAS and Iowa DOT design manuals include information on the selection of bicycles facilities and much more design detail focused on on-street bicycle facilities (SUDAS 2024, Iowa DOT 2019). Design information is provided for, among other things, bicycle lane widths, markings, lanes on two-way and one-way streets, counterflow bicycle lanes, bicycle lanes adjacent to on-street parking, buffered bicycle lanes, and separated bicycle lanes (SUDAS 2024, Iowa DOT 2019). Some conventional designs are adjacent to the travel lane, but buffered lanes have a striped buffer between the vehicles and bicycles (SUDAS 2024, Iowa DOT 2019). A separated bicycle lane, on the other hand, is physically separated from vehicle traffic through the use of vertical delineator posts, planters, or other vertical features (SUDAS 2024, Iowa DOT 2019). The *Iowa Bicycle and Pedestrian Long-Range Plan* published by the Iowa DOT also includes two very useful tools that can be used in the selection of bicycle and pedestrian facilities for different situations (Iowa DOT 2018). One tool consists of two matrices that help with facility selection based on posted speed limit, traffic volume, and context. The other is a table summarizing the characteristics and attributes of different types of bicycle and pedestrian facilities. Discussions of bicycle facilities are also incorporated into the Complete Streets section of the SUDAS *Design Manual* (SUDAS 2024).

The AASHTO *Guide for the Development of Bicycle Facilities* indicates that bicycle lanes should be provided on both sides of a roadway to discourage wrong way riding (AASHTO 2012). It also recommends that bicycle lane widths generally be from 5 to 8 feet and designed in consideration of vehicle doors opening when bicycle lanes are adjacent to on-street parking (AASHTO 2012).

SUMMARY

A cross section conversion project is often good time to consider the addition of pedestrian and/or bicyclist facilities and treatments and sometimes to incorporate these facilities at a relatively low cost. The information above summarizes some of the characteristics of facilities and treatments that are designed and operate parallel to vehicle traffic lanes. Reference is made to both national and Iowa guidance that may be of value when the addition of these parallel facilities and treatments is considered. As noted above, the reader is also referred to other summaries in this series that address some of the potential safety impacts of sidewalks and bicycle lanes.

References available in: Knapp, K., and D. Veneziano. 2024. *Roadway Cross Section Reconfiguration: Responses to 14 Commonly Asked Questions.* Iowa Local Technical Assistance Program, Institute for Transportation, Ames, IA. https://intrans.iastate.edu/uploads/2024/10/roadway_cross_section_reconfiguration_w_cvr.pdf.