

Appendix 6. Complete Streets

The Capital Area MPO and Durham-Chapel Hill-Carrboro MPO support street cross-section designs and safety counter measures with the objective to create roadways that are multi-modal, sensitive to the local context (e.g., land use, non-automotive trips), and safe. This support is evident not only in the funding that the MPOs direct to multimodal projects but also in the multimodal design guidelines and safety countermeasures referenced in this section.

Street Cross Sections and Guidelines

The 2045 MTP includes the following guidelines by reference:

1. **Complete Streets** - The street cross sections and guidelines in Chapter 4 of the North Carolina Department of Transportation's Complete Streets Planning and Design Guidelines. The illustrations show the intended spatial relationships of the various street components, and serve as a diagram of one or more possible street configurations. The guidelines provide ranges that allow the design team the flexibility to respond to particular conditions.

The cross-sections should not be used in isolation. Consideration of the context and other elements must be brought into the decision making process. The final cross-section and design of a road depends on many operational, planimetric, contour and land use factors, and thus design decisions must be made on a case-by-case basis.

2. **Manual on Uniform Traffic Control Devices (MUTCD)** - All pavement markings and placement of pavement markings should follow the guidelines specified in the current edition.
3. **NACTO Design references** – The National Association of City Transportation Officials (NACTO) has prepared the following guidelines specifically for urban settings:
 - a. NACTO Urban Bikeway Design Guide
 - b. NACTO Urban Street Design Guide
 - c. NACTO Transit Street Design Guide
 - d. NACTO Urban Street Storm water Guide

Safety Countermeasures

Improving safety is a top priority for both the Capital Area MPO and Durham-Chapel Hill-Carrboro MPO, which are committed to reducing transportation fatalities and serious injuries on and along our region's roadways. In September 2017, FHWA issued a "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures." This guidance takes into consideration the latest safety research to advance a group of countermeasures that have shown great effectiveness in improving safety for motorists, pedestrians and bicyclists.

Safety practitioners are encouraged to consider this set of countermeasures that are research-proven, but not widely applied on a national basis. As both the Capital Area MPO and Durham-Chapel Hill-

Carrboro MPO develop plans to address mobility and safety challenges, they are to consider the benefits and use of these proven roadway safety tools and techniques.

1. **Safety Edge** – The Safety Edge asphalt paving technique minimizes vertical drop-off safety hazards and has a minimal impact on project cost. NCDOT has implemented pilot projects to evaluate the benefits of a safety edge. CAMPO and DCHC MPO will work with NCDOT to use the technique where appropriate.
2. **Roundabouts** –A roundabout is a circular intersection where entering traffic yields to vehicles on the circulatory roadway. Roundabouts substantially improve safety and operations. There are local governments in both MPOs that have ordinance provisions for roundabouts; and both MPOs will encourage their use as needed for transportation system measures.
3. **Corridor Access Management** – Access management is a set of techniques that State and local governments use to control access to highways, major arterials, and other roadways. The benefits of access management include improved movement of traffic, reduced crashes, and fewer vehicle conflicts. Successful access management seeks to simultaneously enhance safety, preserve capacity, and provide for pedestrian and bicycle needs.
4. **Backplates with Retroreflective Borders** – Backplates are added to a traffic signal indication in order to improve the visibility of the illuminated face of the signal and thereby reduce unintentional red-light running crashes.
5. **Longitudinal Rumble Strips and Stripes on 2-Lane Roads** – Longitudinal rumble strips are milled or raised elements on the pavement intended to alert inattentive drivers through vibration and sound that their vehicles have left the travel lane. As discussed in Chapter 9 of the Chapter 4 of the North Carolina Department of Transportation’s Complete Streets Planning and Design Guidelines, when rumble stripes are used, they should be designed to lessen the impacts on other users, specifically bicyclists.
6. **Enhanced Delineation and Friction for Horizontal Curves** – Implementing the recently published curve treatments included in the Manual on Uniform Traffic Control Devices (MUTCD) should improve curve safety over past practices by providing consistency. Treatments include signs, retro reflectivity, flashing lights and surface friction.
7. **Medians and Pedestrian Crossing Islands in Urban and Suburban Areas** – Medians reduce traffic conflicts and increase safety by providing a buffer area between opposing lanes of traffic. Both the Capital Area MPO and Durham-Chapel Hill-Carrboro MPO will support the efforts to apply medians and pedestrian refuge areas where needed to support safety and reduce conflict between motor vehicles and pedestrians.
8. **Pedestrian Hybrid Beacon** – The pedestrian hybrid beacon (also known as the High intensity Activated crossWalk (or HAWK)) is a pedestrian-activated warning device located on the roadside or on mast arms over midblock pedestrian crossings.
9. **Road Diets (Roadway Reconfiguration)** – The classic roadway reconfiguration, commonly referred to as a "road diet," involves converting an undivided four lane roadway into three lanes made up of two through lanes and a center two-way left turn lane. The reduction of lanes allows the roadway to

be reallocated for other uses such as bike lanes, pedestrian crossing islands, and/or parking. Road diets have multiple safety and operational benefits for vehicles as well as pedestrians.

Several road diets have been implemented in the Durham-Chapel Hill-Carrboro MPO and Capital Area MPO areas, and the MPOs will continue to work with NCDOT and local government partners to review potential locations for road diets.

10. **Roadside Design Improvement at Curves** – These design treatments target the high-risk, outside roadside curves by giving vehicles the opportunity to recover safely and by reducing crash severity. Treatments include clear zones, slope flattening, shoulder widening, and roadside barriers.
11. **Reduce Left-Turn Conflict Intersections** – These treatments are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the conflict points. They are often referred to as “superstreets” or “synchronized streets,” and move left-turns to median U-turns.
12. **Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections** – This systemic approach to intersection safety involves deploying a group of multiple low-cost countermeasures, such as enhanced signing and pavement markings, at a large number of stop-controlled intersections within an area or jurisdiction. It is designed to increase driver awareness and recognition of the intersections and potential conflicts.
13. **Leading Pedestrian Intervals** – A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication. This head start results in increased pedestrian visibility, reduced conflicts with vehicles, more motorists yielding to pedestrians and additional crossing time for slower pedestrians.
14. **Local Road Safety Plan** – A local road safety plan (LRSP) provides a framework for identifying, analyzing, and prioritizing roadway safety improvements on local roads. While local roads are less traveled than State highways, they have a much higher rate of fatal and serious injury crashes.
15. **USLIMITS2** – This is a free, web-based tool designed to help practitioners assess and establish safe, reasonable, and consistent speed limits for specific segments of roadway.
16. **Dedicated Right- and Left-Turn Lanes at Intersection** – Auxiliary turn lanes—either for left turns or right turns—provide physical separation between turning traffic that is slowing or stopped and adjacent through traffic at approaches to intersections. Pedestrian and bicyclist safety and convenience should receive considerable weight in the decision and design of adding turn lanes at an intersection.
17. **Yellow Change Intervals** – Since red-light running is a leading cause of severe crashes at signalized intersections, it is imperative that the yellow change interval be appropriately timed. Agencies should institute regular evaluation and adjustment protocols for existing traffic signal timing, and refer to the Manual on Uniform Traffic Control Devices for basic requirements and further recommendations.
18. **Walkways** – A walkway is any type of defined space or pathway for use by a person traveling by foot or using a wheelchair. These may be pedestrian walkways, shared use paths, sidewalks, or roadway

shoulders, and are critical for encouraging non-motorized travel and reducing crashes. Transportation agencies should work towards incorporating pedestrian facilities into all roadway projects unless exceptional circumstances exist

19. **Road Safety Audit** – These audits are unique. They are performed by a multidisciplinary team, which is independent of the project, and consider all road users. Agencies are encouraged to conduct an RSA at the earliest stage possible, as all roadway design options and alternatives are being explored.
20. **Median Barriers** – Median barriers are longitudinal barriers that separate opposing traffic on a divided highway. They significantly reduce the severity of cross-median crashes -- approximately 8 percent of all fatalities on divided highways are due to head-on crashes.