

SECTION C

Safety

1. General Considerations

Cross-section uniformity is one of the most significant factors affecting highway safety. Consistent roadway lane and shoulder width, side slope and clear zone provide drivers a predictable surface to navigate on. Most drivers adjust their speed and attention to the general road situation. There are elements, however, that can potentially disrupt safe driving capabilities. Sharp curves, other abrupt changes in alignment, frequent speed limit changes, and vehicle conflicts caused by frequent driveway entrances all contribute to surprise the unsuspecting driver, and often result in vehicle collisions. These additional adverse driving factors must be minimized in road design.

Project-specific historical crash data should always be reviewed to determine what types of safety improvements can be implemented. Particular attention should be given to the overall critical rate factor and percent of injuries, as well as locations experiencing frequent crashes. Crash data and analysis assistance can be obtained from the Crash Records Section, Traffic Engineering Division of the Bureau of Maintenance and Operations or the Safety Management Section of the Systems Management and Division within the Bureau of Planning.

Crash data for various road classifications, width configurations, AADT's and speeds were reviewed to evaluate crash rate performance. Safety recommendations from this analysis are shown in Table 4. Modifying cross section width from the recommended state standards may be required at times due to environmental, public opinion, or other considerations. The following are situations, where from a safety standpoint, changes may be considered.

- For AADT values less than 1,000, the minimum safety recommendation exceeds the proposed design standards for Minor Collectors and Major Collectors. Wherever possible, the proposed design standard for shoulder width should be increased to reduce crash potential, in accordance with Table 3.
- Conversely, the design standard may be reduced, at least from a safety standpoint, for travel lane and shoulder widths for AADT values ranging from 1,000 to 3,000 for Minor and Major Collectors, and up to 4,000 AADT for Minor Arterial Roads.
- The minimum standards should be increased wherever a larger than Norman proportion of the Design AADT will be comprised of heavy truck volumes, particularly at the lower design volumes, in order to allow for the larger width vehicles. Consideration must be provided for turning radii at intersections and off tracking.

11. Shoulder Surface

Gravel shoulders out-perform paved shoulders when AADT is less than 1,000; but at all other AADT levels, paved shoulders are preferable. Two other shoulder surface selection criteria to consider are that gravel shoulders are more expensive to maintain and that paved shoulders provide a better bike use surface. These combined considerations indicate that, in most cases, paved shoulders are preferable. (Ref: Shoulder Policy, Section G).

111. Lane Edge Line Striping

It is important to note that all travel lane edges should be striped in accordance with the Roadway Configurations provided in Table 3. The lack of a visible edge line is one of the most common user complaints. Also, Run Off Road crashes account for 23% of all crashes and over 39% of all fatal crashes. Proper roadside delineation is considered one of the lowest cost methods to help reduce Run Off Road Crashes. It may be advisable to taper the edge line stripe at intersections to encourage motorists to shift to the right to turn and to discourage trucks and other vehicles from parking on the shoulder for quick entry to convenient stores, or similar stops.

1V. Access Management

The number, location and size of driveway entrances impact the safety and maximum allowable speeds of highways. It is advisable to work with individual property owners to reduce the number and size of highway openings to their property. Whenever possible, avoid allowing entrances at or very near intersections. For corner properties, it may be possible to allow one entrance on each leg of the intersection rather than multiple entrances on either or both legs to allow exiting traffic to take advantage of the intersection controls and thereby increase their safety.

A new law regarding access management on rural arterials was passed by the State Legislature in 2000. Rulemaking occurred in 2001, and an Access Management Policy has been developed and added to these Design Guidelines. Refer to the Access Management & Guideline in the Policy Section (Section G).

V. Additional Considerations for Intersections

Special considerations should be made at intersections to ensure smooth traffic flow at reasonable speeds. For instance, in locations where traffic volumes and conditions fall short of the warrants for a bypass lane, it may be desirable to improve traffic flow at intersections by transitioning into a wider travel width to allow vehicles to continue past left-turning traffic. Avoid installing “slip ramps” and other driver

encouragements to enter intersections at high speeds. Many drivers frequently fail to yield the right of way, or stop suddenly and cause a rear-end crash. Also, elderly drivers lack the mobility needed to turn their heads to view traffic conditions prior to merging.

Consider roundabouts at appropriate intersections, to allow traffic to continue moving at slow speeds. Traffic signals increase delay and frequently result in increased rear-end collisions.

Avoid large expanses of pavement at intersections. The addition of traffic islands helps delineate proper vehicle paths and can provide pedestrian refuge. Lane demarcation signs should be installed overhead whenever possible. This practice allows drivers to determine sooner which lane they should be in, and reduces future maintenance costs resulting from pavement paint markings.