Geometric Design
Strategic Research Program

AASHTO Technical Committee on Geometric Design
- Green Book Update

Potential Areas of Research Needs for Next Green Book Update
Methodology

Research on alternatives to using Design Speed as a control for selecting certain design criteria

Review of the current functional classification system used in the Green Book

Updating the AASHTO 2001 Guidelines for Geometric Design of Very Low-Volume Local Roads

Green Book revisions to improve consistency with AASHTO Highway Safety Manual

Research to update the published PDO crash value to use when computing Benefit/Cost of safety measures (revise assumed value to better reflect current costs of vehicle body repairs)
Highways

Updated headlamp design criteria for sag vertical curves (changes to sag vertical curve model based on modern headlight technologies) – Research underway

Updated Vehicle Performance Characteristics
Heavy vehicle characteristics (Potential truck size and weight changes)

Verify/update findings in NCHRP Report 270 (published in 1984) “Parameters Affecting Stopping Sight Distance”

Verify/update information regarding vehicle acceleration and deceleration rates
Highways Continued

Impacts to highway geometry if proposed truck size and weight changes are made

Guidance for superelevation design on steep grades (if needed beyond the results from the current research project underway – NCHRP 15-39)

Research on the affect of cross-slope break on trucks and the relationship to vehicle tracking, traveled-way widening and lane widening on horizontal curves

Vertical alignment of driveway entrances – grade and vertical curvature, lowest threshold for design vehicles, affects on speed of entering/exiting vehicle and affects on mainline operations. (Jim Gattis – Arkansas - completed some research on this topic)
Streets and Intersections

Research on the acceleration and deceleration characteristics of vehicles in the vicinity of intersections

Parking lane width on local streets and roads (widths in 2004 edition may be a little excessive, but there is no solid basis for either the current or proposed values other than the committee’s judgment)

Possible related research

TRR 2190 (Bicycles 2010) had an article, “Parking Lane Width and Bicycle Operating Space,” but that was geared toward drivers’ parking habits given particular parking lane widths.

“Cross Section Width for Parallel Parking;” Gattis, Dammalapati, Cotton and Cotton, 2007 (which Joe Ruffer assisted with).

NCHRP 15-42 is looking at varying bike and parking lane widths on the operation of both bicycles and adjacent motor vehicles.
Streets and Intersections Continued

Guidance to clarify the use of sloping curbs and vertical curbs, especially in transitional area (building on NCHRP 504 – Interaction of Curbs)

Expanded Green Book guidance on typical section examples showing curb sections
Sidewalks and curb cuts based on PROWAAG

Should the Green Book provide more flexible design criteria ranges for some local roads and streets? (i.e. - narrower street widths may be appropriate for some local roads)
  Consider “Urban User” criteria when dealing with very low vehicle speed / highly walkable streets

Potential Green Book additions regarding walkable urban thoroughfares with references to the ITE publication
Streets and Intersections Continued

Green Book guidance on mid-block pedestrian crossings

Research on pedestrian conflicts on single lane and multi-lane roundabout approaches

Research on the operational effects on roundabout with pedestrian signals for crosswalks on multi-lane roundabout approaching and leaving roadways

Updated research on prevalence of lane encroachment and/or sideswipe crashes on multi-lane roundabouts that utilize the current suggested signing and marking practices for multi-lane roundabouts

Guidance for designing roundabouts to accommodate extra large vehicles (i.e. “superloads”)

Evaluation of operation and crash history of intersections with indirect left turn treatments including jug-handle or loop, displaced left turns, and median U-turn crossovers as compared to intersections with direct left turn movements.
Comparison of pedestrian safety (conflicts, crashes, injuries, etc.) for intersections with:
- Right-turn channelization island with YIELD condition for right turn lane at cross street and signalized crosswalk across main street with no median refuge
- Signalized crosswalk across main street with median refuge at center of intersection with no right turn channelization island
- Right-turn channelization island with YIELD condition for right turn lane at cross street and signalized crosswalk across main street with median

Comparison of pedestrian crossings of low speed and high speed arterial streets at intersections and at mid-block locations with various treatments (mid-street refuge passive warning devices, hybrid signal/beacon devices, and signals) on pedestrian safety and pedestrian and motor vehicle delay and operation.

Comparison of crashes with use of bicycle lanes versus shared lanes on low-speed roadways (less than 40 mph)

Evaluation of crosswalk location impact on pedestrians with vision impairment (recommended additional research from NCHRP 3-89: Design Guidance for Channelized Right Turn Lanes)
Freeways and Interchanges

Additional research suggested from 3-88 interchange spacing. Spacing guidelines between system (freeway-freeway) interchanges and service interchanges.

Follow up from NCHRP 20-7 Lane Management and Toll Plaza Design.

Freeway mainline ramp terminals.

Design guidance for Double Crossover Diamond (aka Diverging Diamond) Interchanges.

Design guidance for freeway managed lane facilities (leading perhaps to a “Special Freeway Design” section of the Green Book).