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# Engineering Standards In Highway Design Litigation

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## Chapter 15

# Engineering Standards in Highway Design Litigation

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### INTRODUCTION

We will begin our review of highway design with a discussion of *A Policy on the Geometric Design of Highways and Streets*, published by AASHTO, the *American Association of State Highway and Transportation Officials*.<sup>1</sup> Commonly called the “Green Book,” this collection of highway standards was originally published by American Association of State Highway Officials (AASHO), the forerunner of AASHTO, in the 1930s. The Green Book is a series of guidelines on highway design, specifically the geometric design of the roadway. The reader should note that these guidelines are not “hard” standards, i.e., the designer of a roadway, while following the guidelines, has considerable flexibility; the Green Book provides guidance to the designer by referencing a recommended range of values for critical highway dimensions.

The design criteria in the Green Book for the roadways of a given state must be adopted by that state or set by court decision. Nationally, the FHWA, the *Federal Highway Administration*, has adopted the applicable guidelines in the Green Book for the *National Highway System*, specifically for the interstate highways and some of the primary routes. Although the secondary roads of any given state are subject to the standards of that state, those standards are usually based on Green Book criteria.

*Definition:* Human factors (and ergonomics)—the practice of designing products, systems, or processes to take proper account of the interaction between them and the people who use them. See the Wikipedia web page definition: [https://en.wikipedia.org/wiki/Human\\_factors\\_and\\_ergonomics](https://en.wikipedia.org/wiki/Human_factors_and_ergonomics).

To illustrate the complexity of the highway design process, we list some details of design that are not covered in the Green Book:

- The designer must survey the site and establish his problem definition.
- After he has familiarized himself with the highway, its particular challenges, he must define the project.
- With the complexity of the design in view, the designer must decide just when the project is complete. As the saying goes, once the main goals are reached there can be no “nickeling and diming” additions to the highway.
- Now comes the most remote, the most ethereal process of all. The designer, using the survey and a great deal of experience, must develop the project concept. He answers the question: “How do I solve all of the roadway problems without creating unsafe conditions leading to motor vehicle accidents?”
- Next comes paying attention to detail that seems obvious but requires both engineering training and a view toward human factors: The highway must be marked with edge lines, center lines, and dashed lines to ensure that a driver will understand the limitations of space and know where to be directed to enter or exit the roadway, -- especially at night or in poor visibility conditions.
- The experience of the designer is also critical when placing an appropriate design onto a highway. The design must be consistent with the highway type, its level. To design a secondary road intersection using the requirements of a freeway would make no sense.
- Detail in highway design requires the selection of equipment that demands the experience of the designer. For example, where should the beginning of a given guard rail be placed? If it does not cover the approach to a ravine, a vehicle may slip by the end of the guard rail, causing a fatal accident that otherwise might be only a dented fender.

1. AASHTO, Suite 225, 444 North Capital Street, N.W., Washington (DC); 2001.

- The designer must determine the *functional classification* of the highway. We will talk more about this concept later in the chapter.
- The *functional requirements* of the highway must be established: its capacity and level of service (Relating to the number of vehicles expected to travel per day, as an example).
- Structural designs have to be done for structures such as bridges, overpasses, and sign supports. These are not easy tasks in that the human factors elements have to be guaranteed to work.
- The landscaping of a site has to be designed, not only for the looks of it but also to guarantee that safety requirements are met. For example, escape ramps are needed to allow semis to come to a halt on a grade when the brakes are lost going downhill.
- For those applications where overhead lighting is required, the entire technology of lighting must be reviewed to get the best results.
- Because of the large variation in the topography found at a site, care must be taken during design of the roadside to make sure sightline distances are preserved and no confusing images are presented to drivers. This is an example of the requirements for human factors that are always present.
- And, for a signal-controlled intersection, the design of such a system requires candidate traffic studies.<sup>2</sup>
- In general, standards and policies are used by FHWA to ensure and maximize the quality, objectivity, utility, and integrity of information.<sup>3</sup>

## QUESTIONS THAT CAN BE ASKED OF ANYONE IN THE HIGHWAY DESIGN FIELD

*What should an expert in highway design know?* We will attempt to give the reader a general answer to the question in this chapter. That answer will be useful to the attorney reader. However, we emphasize that a forensic engineer must spend several years in study to gain the experience necessary to do forensic work in the field. To illustrate the difficulties in this, we ask more rhetorical questions.

*In the design of a highway, is it practical to attempt a design that results in zero fatalities over the life of that highway?* The answer to this question is "No, because it ignores statistical reality."<sup>4</sup>

*What analysis tools have become available to assist the highway designer?* The reader will be interested to know that modern highway design is done using simulation with statistical tools: The *Integrated Highway Safety Design Model*, the *Safety Analyst*, the *Crash Modification Factor (CMF) Clearinghouse*, and spreadsheets. Resources from FHWA and National Cooperative Highway Research Program are also available.<sup>5</sup> We will say more about that in the chapter.

*Where can the Highway Safety Manual (HSM) be applied?* The attorney reader will note that the manual is set up for assisting in planning, environment, design, and operations.

*What is the approach of the HSM to safety?* The HSM provides the analysis tools for planners, designers, and traffic engineers to evaluate the safety impacts of decisions in project development on crash frequency and crash severity.<sup>6</sup>

*How are highway project development decisions based?* Decisions on design are based on a full evaluation of costs, right-of-way, operations, environmental factors, and safety.<sup>7</sup>

*What is the major objective of using the HSM?* To reduce fatalities in motor vehicle accidents while studying mobility, the environment, and other competing needs.<sup>8</sup>

*How is the HSM applied to the planning phase?* The HSM provides the ability to assess anticipated changes in crash frequency or severity through the use of *CMFs*.<sup>9</sup>

2. The reader should examine *The Manual on Uniform Traffic Control Devices for Highways and Streets* to gain insight as to the thinking on this topic.

3. *Integrating the HSM into the highway project development process*, U.S. Department of Transportation, Federal Highway Administration, [http://safety.fhwa.dot.gov/hsm/hsm\\_integration/](http://safety.fhwa.dot.gov/hsm/hsm_integration/).

4. <http://www.fhwa.dot.gov/infrastructure/safety02.cfm>. In 1954, President Eisenhower designated December 15th as *National Safe Driving Day*. He stated, "If we are determined to have a day without a traffic accident in all of America, we can have it." As the record shows: "The results were not as dramatic as hoped. - - On the first [Safe-Driving] Day in 1954, 51 people were killed and 966 were injured in 3935 crashes. - - On the comparable Wednesday in 1953 (December 16), 60 people were killed and 1807 people were injured on the Nation's highway in 4907 crashes." It appears that the only way to get zero deaths on a roadway over its life is to barricade the ends and prohibit traffic on it. Safe Driving Day was an average day.

5. See footnote 3.

6. See footnote 5.

7. See footnote 6.

8. See footnote 7.

9. See footnote 8.

*How can the HSM be applied to trade studies?* During the project development process, i.e., the trade studies, and during environmental analyses, safety studies can be carried out to ensure that the technology is included. It is possible to incorporate the historic safety performance of existing roads into these studies.

*How can the HSM be incorporated in the design process?* The attorney reader may be surprised to learn that design is always a judgment call. The experience of the designer will always come into play at some point in the design process. To aid the designer, the HSM provides the capability for carrying out safety performance-based design.<sup>10</sup>

*How can the HSM be applied to everyday events, i.e. operations and maintenance?* With system monitoring, opportunities for improvement of safety can be assessed using actual data with science-based methods from the manual.<sup>11</sup> The advantage then becomes evident: An entire system can be studied for safety performance. Maintenance policies and priorities can be improved using the experience from the system; in particular, trade-offs between maintenance improvements can be studied using methods from the manual.

*What are the analysis tools available from the HSM?* Several simulation and record-keeping tools are available from the manual and its accompanying literature: AASHTO (American Association of State Highway and Transportation Officials) manuals, the ISHSDM (Integrated Highway Safety Design Model), the FHWA CMF clearinghouse, and guides from FHWA.<sup>12</sup>

## STATE ROADWAY DESIGN MANUALS<sup>13</sup>

The table below indicates the online location of State highway agency roadway design manuals, when available. If the design manual is not available online, the URL listed is the State website with other design information. State Standard Drawings can be found at <http://www.fhwa.dot.gov/programadmin/statestandards.cfm>.

State	URL
AK	Preconstruction Manual
AZ	Engineering Records Publications
AR	Arkansas State Highway and Transportation Department Info
CA	Highway Design Manual
CO	CDOT Design Guide 2005
CT	Highway Design Manual (.pdf)
DE	Road Design Manual
FL	Designer Manuals
GA	GDOT Design Policy Manual
ID	Design Manual
IL	Bureau of Design and Environment Manual
IN	Design Manual
IA	Office of Design—Design Manual
KS	Standard Specifications for State Road and Bridge Construction
KY	Highway Design Manual
MA	Project Development & Design Guide
MI	Road Design Manual
MN	Road Design Manual
MT	Manuals, Guidelines and Catalogs
NE	Roadway Design Manual and Updates
NV	Reports and Publications
NH	Information for Engineers, Contractors and Consultants

10. See footnote 9.

11. See footnote 10.

12. [www.highwaysafetymanual.org](http://www.highwaysafetymanual.org), [www.safety.fhwa.dot.gov/hsm](http://www.safety.fhwa.dot.gov/hsm), and [www.safetyperformance.org](http://www.safetyperformance.org).

13. <http://www.fhwa.dot.gov/programadmin/statemanuals.cfm>.

State	URL
NJ	Roadway Design Manual
NY	Highway Design Manual
NC	Structure Design Unit's Design Manual
	Highway Design Branch—Design Manual
OH	Roadway Standards: Location and Design Manuals
OK	Roadway Design Standards and Specifications
OR	Highway Design Manual
PA	Highway Quality Assurance Division Standards and Criteria Section
RI	Standard Specifications for Road and Bridge Construction
SC	Road Design Plan Preparation Guide
SD	Road Design Manual
TN	Design Division Online Resource Library and Links
UT	Roadway Design Manual of Instruction
VT	Vermont State Design Standards (.pdf)
VA	Road Design Manual
WA	Design Policy, Standards, and Safety Research Unit
WV	Engineering Publications and Manuals
WI	Facilities Development Manual
WY	Road Design Manual
FHWA Federal Lands	2005 Project Development and Design Manual

## RESOURCES

1. AASHTO. *The highway safety manual*. Washington (DC): American Association of State Highway Transportation Professionals; 2010. <http://www.highwaysafetymanual.org>.
2. FHWA. *FHWA Technical Advisory T6640.8A: Guidance for preparing and processing environmental and section 4(F) documents*. Washington (DC): Federal Highway Administration: Planning, Environment, and Realty; 1987. <http://environment.fhwa.dot.gov/projdev/impTA6640.asp>.
3. FHWA. Washington (DC): FHWA About Operations Website; 2012a. <http://ops.fhwa.dot.gov/aboutus/aboutus.htm>.
4. FHWA. Washington (DC): FHWA Safety Program Website; 2012b. <http://safety.fhwa.dot.gov>.
5. FHWA. *HSM case study 1: using predictive methods for a corridor study in Idaho*. Washington (DC): Federal Highway Administration: Office of Safety; 2012c. [http://safety.fhwa.dot.gov/hsm/casestudies/id\\_cstd.cfm](http://safety.fhwa.dot.gov/hsm/casestudies/id_cstd.cfm).
6. FHWA. *HSM case study 2: implementing a new roadway safety management process with safety analyst in Ohio*. Washington (DC): Federal Highway Administration: Office of Safety; 2012d. [http://safety.fhwa.dot.gov/hsm/casestudies/oh\\_cstd.cfm](http://safety.fhwa.dot.gov/hsm/casestudies/oh_cstd.cfm).
7. FHWA. *HSM case study 3: using predictive methods for alternative selection in Florida*. Washington (DC): Federal Highway Administration: Office of Safety; 2012e. [http://safety.fhwa.dot.gov/hsm/casestudies/fl\\_cstd.cfm](http://safety.fhwa.dot.gov/hsm/casestudies/fl_cstd.cfm).
8. FHWA. *HSM case study 4: development of safety performance functions for network screening in Illinois*. Washington (DC): Federal Highway Administration: Office of Safety; 2012f. [http://safety.fhwa.dot.gov/hsm/casestudies/il\\_cstd.cfm](http://safety.fhwa.dot.gov/hsm/casestudies/il_cstd.cfm).
9. FHWA. *HSM case study 5: HSM implementation plans – New Hampshire DOT experience*. Washington (DC): Federal Highway Administration: Office of Safety; 2012g. [http://safety.fhwa.dot.gov/hsm/casestudies/nh\\_cstd.cfm](http://safety.fhwa.dot.gov/hsm/casestudies/nh_cstd.cfm).
10. FHWA. *FHWA practitioners primer: integrating road safety into NEPA analysis*. Washington (DC); 2011. <http://safety.fhwa.dot.gov/hsip/tsp/fhwasal136/fhwasal136.pdf>.
11. FHWA. *Integrating road safety into NEPA analysis: a primer for safety and environmental professionals*. Washington (DC): Federal Highways: Office of Safety; 2011. <http://safety.fhwa.dot.gov/hsip/tsp/fhwasal136/fhwasal136.pdf>.

12. Herbel S, Laing L, McGovern C. *FHWA highway safety improvement program manual*. Washington (DC): FHWA Office of Safety; 2010. <http://safety.fhwa.dot.gov/hisp/resources/fhwasa09029/fhwasa09029.pdf>.
13. McGovern C, Van Schalkwyk I. *HSM training guide*. Washington (DC): Prepared for the Federal Highway Administration: Office of Safety; 2010. <http://safety.fhwa.dot.gov/hsm/training/hsmguide.pdf>.30.
14. NCDOT. *NCDOT safety evaluation group: completed projects – completed projects, report: completed projects*. Raleigh (NC): North Carolina Department of Transportation; 2012. <http://www.ncdot.org/doh/preconstruct/traffic/safety/Reports/completed.html>.
15. NCHRP. *Lead states initiative for implementing the highway safety manual*. Washington (DC): Transportation Research Board, National Academies; 2010. <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2974>.
16. NCHRP. *Human factors guidelines for road systems*. Washington (DC): Transportation Research Board, National Academies; 2012. Forthcoming, project information. Available at: <http://www.trb.org/Main/Blurbs/159691.aspx>.
17. Neuman T, Van Schalkwyk I. *FHWA HSM implementation guide for managers*. Washington (DC): Prepared for the Federal Highway Administration: Office of Safety, Washington (DC); 2011. [http://safety.fhwa.dot.gov/hsm/hsm\\_mgrs-guide/hsm\\_mngrguide.pdf](http://safety.fhwa.dot.gov/hsm/hsm_mgrs-guide/hsm_mngrguide.pdf).
18. Stein WJ, Neuman TR. *Mitigation strategies for design exceptions*. Report No. FHWA-SA-07-011. Washington (DC): Prepared for Federal Highway Administration: Office of Safety; 2007. [http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/fhwa\\_sa\\_07011.pdf](http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/fhwa_sa_07011.pdf).31.

## DECISIONS PRIOR TO THE DESIGN PROCESS

Aesthetics can influence a highway design. The designer will speak of designing within an *appropriate context*. An example is the comparison between the exit from a freeway and the entrance to an in-town parking lot. The speed limit is set at 25 mph for both but, beyond that, the freeway exit puts the vehicle into a known place, a known situation, in which no pedestrians are expected to be found walking. The entrance to the parking lot, in contrast, can have vehicles coming from several directions and pedestrians attempting to walk to or from their vehicles, - - often with their backs to an entering vehicle.

There are fundamental questions that must be answered before a roadway design takes place, before the Green Book or state standards are addressed. The answers to these questions are decisions that are made before the design process starts. Examples include

- Is the proposed roadway a two-, three-, four-, six-, or eight-lane design?
- Does the proposed roadway have a median?
- Are the roadway junctions at grade or are they grade separated?
- What are the aesthetics and safety issues?

Design must take into account the answers to such questions, the design decisions, framed with the appropriate design criteria in the Green Book or the state standards. The reader will note the experience that is required to accomplish this.

## TYPES OF HIGHWAY DESIGN PROJECTS

*There are four common roadway design projects: New Construction; Reconstruction; Resurfacing, Restoration, Rehabilitation; and Maintenance.*<sup>14</sup>

In new construction, the designer is given a blank page, subject to cost constraints, and asked to create the project from the beginning. He has the most freedom of design with this option. In reconstruction, the major decisions at the beginning of construction created the design. Any changes in that design will produce additional costs, which will have to be dealt with if improvements in safety are needed. Resurfacing, restoration, and rehabilitation involve the extension of the service life of the roadway and the addition of safety enhancements. Maintenance projects imply that no real changes will be made; they are projects necessary to keep a roadway in good condition.

## WORK ZONE SAFETY<sup>15</sup>

As late as 1999, there was not a nationwide definition of a “work zone”. Each of the 50 states is different in its approach to roadway safety.

14. Note that each of these design projects will require a construction site; each requires traffic control, which introduces its own risks in safety.

15. Turner JD. What's a work zone? *Public Roads* May/June 1999;62(6).

From Chambless et al.,<sup>16</sup> studies show that work zones on interstates, US highways, and state roads, are sites of 63% of work zone crashes, i.e., most of the crashes at speed in work zones are found on those highways. Work zone crashes have unique characteristics. From their study, 25% of work zone crashes occur with drivers more than 25 miles from home. Twenty-seven percent of work zone crashes involve misjudging stopping distances or following too closely. What was unexpected was that, the involvement of pedestrians in work zone crashes was practically the same rate as non-work zone crashes. This is in spite of the concern for pedestrians at work zones. Worker safety signs appear at every work zone; the threat of a prison term does not seem to change the statistics.

Six countermeasures have been proposed to reduce work zone crashes<sup>17</sup>:

- Work zone speed limits;
- Police presence;
- Speed limit enforcement;
- Public education;
- Sign credibility; and
- Temporary pavement markings.

Portable barriers and signage for “queues ahead” are also discussed. The theory is that the barriers may prevent vehicles from following too closely. The signage would need a careful study in human factors for queues ahead. The study also shows that limiting the speed variance, i.e., keep it at one speed, limits crashes.

## MODERN STUDIES, ANALYSES FOR HIGHWAY DESIGN

Modern studies with analyses for highway design place a greater emphasis on safety. Although designing for safety in highway design appears to be a logical, almost obvious goal, the tools to accomplish it have not been so easy to obtain. And they are fraught with the usual engineering problems of chaotic data. The new tools for highway safety design appear in several publications.<sup>18–24</sup> One paper providing guidelines for applying these tools in the preliminary design stage proposes assessing design consistency and evaluating design exceptions.<sup>25</sup>

The variables in simulation for studying the effects of design change on safety are termed *Accident Modification Factors* (dependent variables) and *Crash Reduction Factors* (CRFs) (independent variables).<sup>26</sup> CRFs were developed for the *Federal Hazard Elimination Program*.<sup>27,28</sup> CRFs were used to estimate the effects on safety of the geometry of a specific highway segment or intersection, the traffic control devices used on the segment or at the intersection, the signalization used at the intersection, and the roadside clear zone or safety appurtenances. By 2004, about 80% of the state departments of transportation in the United States have used CRFs to help identify safety improvements for locations with above-average crash patterns.<sup>29,30</sup>

16. Chambless J, Ghadiali AD, Lindly JK, McFadden J. Multistate work-zone crash characteristics. *ITE Journal* May 2002.

17. See footnote 16.

18. Roberts K. *Safety conscious planning: the development of safer transportation network planning process*. Washington (DC): Institute of Transportation Engineers; 2001.

19. TRB. Incorporating safety in transportation planning. In: *Special seminar presented at 81st annual meeting of the transportation research board*. Washington (DC); 2002.

20. De Leur P, Sayed T. Developing a systematic framework for proactive safety planning. *Transportation Research Record* 2002;1784:34–42.

21. Lord D, Persaud BN. Estimating the safety performance of urban transportation networks. *Accident Analysis and Prevention* 2004;36(4):609–20.

22. Bahar G, Masliah M, Mollet C, Persaud B. *Integrated safety management process*. NCHRP Report 501. Washington (DC): National Cooperative Highway Research Program; 2003.

23. De Guevera FL, Washington SP, Oh J. Forecasting crashes at the planning level: a simultaneous negative binomial crash model applied in Tucson, Arizona”. In: *Paper presented at the 83rd Annual Meeting of the TRB*. Washington (DC); 2004.

24. Dumbaugh E, Myer MD, Washington SP. Incorporating state highway safety agencies into safety-conscious planning processes. In: *Paper presented at the 83rd Annual Meeting of the TRB*. Washington (DC); 2004.

25. Lord D, Bonneson JA. Role and application of accident modification factors (AMFs) within the highway design process. In: *Paper presented at the 85th Annual Meeting of the Transportation Research Board*, November 14, 2005.

26. See footnote 25.

27. Zegeer C. *Highway Safety Improvement Program (HSIP)*. Report FHWA-TS-81-218. Washington (DC): Federal Highway Administration; 1981.

28. Laughland J, Haefner L, Hall J, Clough D. *NCHRP report 162: methods for evaluating highway safety improvements*. Washington (DC): National Cooperative Highway Research Program, Transportation Research Board; 1975.

29. See footnote 11.

30. Shen J, Rodriguez A, Gan A, Brady P. Development and application of crash reduction factors: a state-of-the-practice survey of state departments of transportation. *Paper No. 04–3508*. Presented at the 83rd Annual Meeting of the Transportation Research Board. Washington (DC); 2004.

The definition of *CRF* is given in the literature as

$$CRF = 1 - N_w/N_{w/o}, \quad (15.1)$$

where *CRF* = the crash reduction factor associated with a specific improvement; *N<sub>w</sub>* = the expected number of crashes with the improvement, crashes/year; and *N<sub>w/o</sub>* = the expected number of crashes without the improvement, crashes/year.<sup>31</sup>

The effect of one countermeasure, an improvement, can be found, once the *CRF* is known using the equation:

$$\Delta N = -N_{w/o}CRF, \quad (15.2)$$

where  $\Delta N$  is the reduction in crashes because of implementation of a safety improvement, a countermeasure.

## Comment

The data going into these calculations are key to the argument produced in using them. The authors note that analyses are only as good as the data being used to achieve the insight. Thus, the analyses, and the designs themselves, need a considerable amount of experience of the analyst and designer.

## DESIGN EXCEPTIONS

In some instances, there are designs that require exceptions to the minimum criteria set down in the Green Book or state rules. These happen because costs may be too high or there would be a major impact on the environment. The design exception process for the Federal Highway System allows for the use of criteria lower than those specified as minimum acceptable values in the Green Book.

For projects in the National Highway System, FHWA requires that all exceptions from accepted guidelines be justified and documented. Formal approval is required for specific controlling criteria.

For projects in the state systems, the process of justification and documentation may be followed by a state with an exemption from the oversight by the FHWA. Under Intermodal Surface Transportation Efficiency Act (ISTEA), a state can request that exemption from oversight.

The subject criteria are

1. design speed;
2. lane width;
3. shoulder width;
4. bridge width;
5. structural capacity;
6. horizontal alignment;
7. vertical alignment;
8. grade;
9. stopping sight distance;
10. cross slope;
11. superelevation;
12. vertical clearance; and
13. horizontal clearance (does not include the clear zone).

The last item, horizontal clearance, at clear zones creates special cases that can require a design exception.

Design speed is key to understanding all of the human factors elements in a design.

## HIGHWAY DESIGN LITIGATION

For most states, *sovereign immunity* is not allowed in highway design litigation. A look through *LexisNexis* at the results of "highway design" as key words shows 845 cases in all US Courts. Suits against highway agencies have risen steadily since 1970, according to AASHTO records. The AASHTO records also reveal that malfunctioning of traffic control devices and lack of maintenance are the source of the majority of these cases.

<sup>31</sup>. See footnote 11.



If a highway agency is sued as the result of an accident by a member of the public, the agency is accused of being *negligent* in the design of a roadway or its maintenance. If negligent, the agency failed to use due care in the treatment of the victim as compared with what a reasonable man would have done.

Standards come into highway design litigation through the contents of the Green Book, a state's adopted highway standards, federal and state regulations and guidelines, and research publications issued by the *Transportation Research Board*. These documents may be used to educate the jury about the standard level of practice in a design. However, these are only a portion of the case.

Adherence to accepted standard practices does not prove that reasonable care was exercised. Also, a design that does not follow guidelines exactly, i.e., an exception is in place does not prove negligence automatically. Both parties in the suit are encouraged to examine the design in depth. That usually means that the designer will be deposed at length about his analyses and decisions:

*The plaintiff attempts to prove that the design is defective, usually because an alternative is shown to be available that would have been effective in preventing the accident.*

*The defense attempts to prove that the standards (guidelines) are not applicable or that they could not be reasonably met.*

The FHWA literature teaches us that concerns about litigation have begun to drive the design process. Designers may become very conservative in their designs. They could avoid innovative and creative approaches to design problems. The recommendation in the face of this is to document everything thoroughly.

## AASHTO, THE GREEN BOOK, ITE, AND THE EVOLUTION OF HIGHWAY DESIGN

*We describe the evolution of AASHTO guidelines and their relationship to tort liability.*<sup>32</sup>

AASHTO's guidelines have become more flexible with time.<sup>33</sup> Over that time, states have abridged the scope of sovereign immunity that once protected state and local governments from being sued for negligent highway design.<sup>34</sup> We examine a bit of history.<sup>35</sup>

The AASHTO<sup>36</sup> was formed in 1914.<sup>37</sup> In the beginning, AASHTO lobbied the federal government to increase highway spending.<sup>38</sup> In the 1930s, AASHTO began drafting road design guidelines.<sup>39</sup> In 1957, AASHTO published a manual proposing that major streets have at least six to eight 12-foot lanes.<sup>40</sup> AASHTO's objective was to expedite traffic.<sup>41</sup>

In 1973, AASHTO was renamed AASHTO to reflect the fact that its membership included transportation officials outside highway departments.<sup>42</sup> But AASHTO's guidelines have continued to focus on the interests of motorists. The 1994 edition of AASHTO's *Policy on Geometric Design of Highways and Streets*, the Green Book, provides that the goal of street design is to create "operational efficiency, comfort, safety, and convenience for the motorist."<sup>43</sup> It emphasizes high-speed design. State and local governments have generally followed the Green Book's guidelines.<sup>44</sup> Most states base their highway design regulations on the many AASHTO books and reports published over the last 50 years.<sup>45</sup> Indeed, until 1991 the federal government required state and local governments to do so when building federally funded road projects.<sup>46</sup>

32. Lewyn M. *Why pedestrian-friendly street design is not negligent*. University of Louisville Law Review, 47 U. Louisville L. Rev. p. 339.

33. See footnotes 78–94 and accompanying text.

34. See footnotes 133–137 and accompanying text.

35. See generally, footnote 32.

36. See *Snearl v. Mercer*, 780 So. 2d 563, 576 (La. Ct. App. 2001) (noting AASHTO's former title).

37. See Jay S. Bybee, *Advising the President: Separation of Powers and the Federal Advisory Committee Act*, 104 Yale L.J. 51, 84 n.172; 1994; Richard F. Weingroff, *For the Common Good: The 85th Anniversary of a Historic Partnership, Public Roads*, Apr. 30, 2001, at 30, at <https://www.fhwa.dot.gov/publications/publicroads/01marapr/commongood.cfm> (describing AASHTO's birth in more detail).

38. See footnote 37.

39. See John C. Glennon, *Roadway Defect Claims*, Association of Trial Lawyers of America, Annual Convention Reference Materials, July 2001, at 765, available at 1 Ann. 2001 ATLA-CLE 765.

40. See Michael Lewyn, *New Urbanist Zoning for Dummies*, 58 Ala. L. Rev. 257; 2006, p. 265.

41. See footnote 48.

42. See footnote 32, at p. 343.

43. *A policy on geometric design of highway and streets*. Washington, (DC): American Association of State Highway and Transportation Officials; 1994 (Metric Units Edition).

44. See footnote 43.

45. See footnote 32, at p. 343.

46. See footnote 45.

State courts consider compliance with AASHTO guidelines a relevant factor in determining whether government employees have negligently designed a road.<sup>47</sup>

For most of the twentieth century, AASHTO guidelines favored rules that allowed traffic to move as fast as possible, regardless of the consequences.<sup>48</sup> Because the federal government mandated that state and local governments follow these guidelines for federally funded roads,<sup>49</sup> AASHTO's rules were highly influential. In recent years, however, these guidelines have become both less important and less auto-oriented: less important because the federal government has recently given state and local officials more flexibility in designing federally funded streets than in the past, and less auto-oriented because AASHTO's own guidelines are now considering the interests of non-drivers to a greater degree than in the past.<sup>50</sup>

Transportation agencies' focus on high-speed traffic makes American streets more dangerous in three ways<sup>51</sup>:

1. A motorist driving at a high speed is more likely to crash into other travelers such as pedestrians, bicyclists, and other drivers. The Green Book discusses that "[s]peed reduces the visual field, restricts peripheral vision, and limits the time available for drivers to receive and process information."<sup>52</sup> At a speed of thirty miles per hour, a motorist has a 150-degree field of vision.<sup>53</sup> At sixty miles per hour, the motorist's field of vision is reduced by two-thirds to fifty degrees.<sup>54</sup> Consequently, a speeding motorist is less likely to notice pedestrians or bicyclists or, for that matter, other drivers.<sup>55</sup>
2. Even if a speeding motorist notices another traveler, the motorist may not be able to stop in time to avoid a collision. The doubling of speed means, as a rule, four times the stopping distance in comparison.<sup>56</sup>
3. Finally, if a motorist does collide with another traveler, the crash is more likely to be fatal if the motorist is driving at a high speed.<sup>57</sup> A pedestrian has a 3.5% chance of being killed by a vehicle traveling at fifteen miles per hour, but the likelihood of death increases to 37% when the vehicle is traveling at thirty- one miles per hour and to 83% when the vehicle is traveling at forty-four miles per hour.<sup>58</sup>

In addition to reducing actual street safety, faster traffic discourages walking and biking because it affects public perceptions of street safety. In 1969, nearly half of schoolchildren traveled to school on foot or bike, while today only 15% do so.<sup>59</sup> According to a study by the Centers for Disease Control, 40% of parents whose children do not walk to school cited danger from traffic as a reason,<sup>60</sup> about twice the number of parents who cited crime or weather as factors.<sup>61</sup> In sum, traffic engineers' emphasis on speed has made American streets more dangerous for pedestrians and bicyclists.<sup>62</sup>

47. See *Shilling v. Louisiana*, 928 So. 2d 95, 100 (La. Ct. App. 2005) (AASHTO standards are a "relevant factor in determining the ultimate issue of whether a roadway is dangerous." (quoting *Aucoin v. Louisiana*, 712 So. 2d 62, 66 (La. 1998))); *Sweet v. Seekonk Planning Bd.*, No. 286204, slip op. at\*8 (Mass. Land Ct. Dec. 21, 2006), available at 2006 WL 3740615 (noting that AASHTO standards "provide valuable evidence of good street design"); Dan Christensen, *Paving the Way for a Road Hazard Case*, Trial, Jan. 1, 2002, 47-48 (noting that AASHTO is "the nation's primary publisher of roadway and roadside design policies and guidelines" and that "their publications can be persuasive in roadway hazard cases."

48. See footnote 32, at pp. 343-45.

49. See Stephen H. Bunting, *Restoring the Rule of Law and Respect for Communities in Transportation*, 5 N.Y.U. Envtl. L.J. 691; 1996. p. 728.

50. See footnote 32, at p. 347-49.

51. See footnote 50, at p. 344.

52. See The American Association of State Highway and Transportation Officials, *A policy on geometric design of highways and streets*, 5th ed. 2004, at 56 ("AASHTO 2004").

53. See footnote 49, at pp. 704-50.

54. See footnote 53.

55. See footnote 32, at pp. 369-70 (slow-speed streets safer for drivers as well as pedestrians).

56. Beer FP, Johnston Jr RR. *Vector mechanics for engineers: statics and dynamics*. 3rd ed. New York: McGraw-Hill; 1977. p. 304.

57. See AASHTO 2004, footnote 52, at p. 56 ("[T]he severity of crashes is generally greater with increased speed.").

58. See footnote 49 at p. 704; see also Philip Langdon, *Calming Rural Roads*, Planning, May 1, 2003, at 30 ("In 2001, a Federal Highway Administration report indicated that lowering speed from 40 to 30 mph halves the fatality risk. In contrast, an article that appeared in 2000 on the Institute of Transportation Engineers website found that when average speed increases from 20 to 30 mph, the risk of injury to pedestrians multiplies 7.6 times."); cf. Andres Viglucci, *Walk at Your Own Risk in State*, Miami Herald, Nov. 21, 2002, at 1B, available at 2002 WLNR 4612969 (indicating that pedestrian fatalities are most common "along wide suburban arterials with fast-moving traffic" and in the most automobile-oriented cities).

59. See footnote 32, at p. 345; Catherine Malina & John M. Balbus, *Environmental Interventions to Help Address the Obesity and Asthma Epidemics in Children*, 17 Duke Envtl. L. & Pol'y F. 193, 195; 2007.

60. See footnote 32, at p. 345.

61. See Don Finley, *Fear Keeps Kids off Their Feet: Once Terrific Walkers, Schoolchildren Don't Have the Run of the Neighborhood Anymore*, San Antonio Express-News, Dec. 10, 2002, at 08A, available at 2002 WLNR 13912775 (by contrast, only "24% cited weather and 18% the fear of crime").

62. Speed limits are frequently ignored on streets and highways designed for high speeds. See David W. Opderbeck, *Peer-to-Peer Networks, Technological Evolution, and Intellectual Property Reverse Private Attorney General Litigation*, 20 Berkeley Tech. L.J. 1685, 1709 (2005) ("In many parts of the United States...highway speed limits are routinely ignored..."); Allen M. Brabender, *The Misapplication of Minnesota's Speeding Statute and the Need to Raise the Posted Limit or Expand Use of the Dimler Amendment*, 27 Hamline L. Rev. 1, 11-12 (2004) (where speed limits are significantly lower than speeds actually traveled by most motorists, such speed limits "are ignored by many drivers and are difficult to enforce"). Thus, speed limit enforcement is unlikely to slow traffic unless cities invest significant resources into monitoring traffic on every major street.

In 1991, the *Intermodal Surface Transportation Efficiency Act* (ISTEA) deregulated street design when it allowed states to use non-AASHTO guidelines on most road projects.<sup>63</sup> The *National Highway System Act of 1995* provided transportation planners additional flexibility because it allowed the design of all roads, other than interstate highways, to take into account “environmental, scenic or historic values,”<sup>64</sup> notwithstanding AASHTO guidelines.<sup>65</sup> As a result, federal law no longer requires state and local transportation planners to follow the Green Book except with regard to building interstate highways.<sup>66</sup>

## Comment

The reader will note the impact that the *National Highway System Act of 1996* made on litigation in highway design. What the decision did is opened all litigation questions in design to expert opinion. Prior to that, standards established designs and municipalities were shielded by *design immunity*.

After the federal government deregulated street design, a group of transportation planners began to create the “context-sensitive design” (CSD) movement.<sup>67</sup> The CSD movement seeks to take account of a street’s historic and economic context before designing the street.<sup>68</sup> As a practical matter, then, the CSD movement encourages transportation engineers to consider the needs of pedestrians and bicyclists as well as the needs of drivers.<sup>69</sup> For example, the CSD movement might encourage narrower streets in a historic downtown than on a limited-access highway.<sup>70</sup>

Traffic engineering organizations are beginning to amend their guidelines to reflect the growth of the CSD movement. In 2006, the *Institute of Transportation Engineers* (ITE), an organization of private consultants and government transportation planners,<sup>71</sup> published guidelines on “context-sensitive solutions”<sup>72</sup> with assistance from the *Federal Highway Administration* and the *Environmental Protection Agency*.<sup>73</sup> The ITE Manual proposes that street networks should “make walking, transit and bicycle travel efficient and enjoyable.”<sup>74</sup>

63. See 23 U.S.C. § 109(o) (2006) (“Projects (other than highway projects on the National Highway System) shall be designed, constructed, operated, and maintained in accordance with State laws, regulations, directives, safety standards, design standards, and construction standards.”); Burrington, See footnote 49, at p. 728 (this language, adopted as part of ISTEA, means that “most streets and roads [are] no longer subject to any federal design rules”) (quoting statutory language). By contrast, before ISTEA, all federally funded projects were governed by the Green Book—a category that was not confined to limited-access highways, but in fact included a wide variety of streets. *Id.* (“most streets and roads” are federally funded and thus affected by ISTEA); Lorick Associates Consulting, Sonoma County Public Works Management & Systems Review: Final Report at 1–2 (2007), <http://www.sonoma-county.org/tpw/pdf/tpwassessmentfinalreport.pdf> [hereinafter Sonoma County Report] (In Sonoma County, California, “23% of roads are federally funded arterial roads, 15% of roads are federally funded residential/local roads and 13% of roads are federally funded collector roads.”); see also footnotes 85–91 and accompanying text (explaining concepts of “arterial” and “collector” roads).

64. 23 U.S.C. § 109(p)(1) (2006).

65. See footnote 49, at pp. 730–31 (describing 1995 legislation and its impact upon use of AASHTO guidelines).

66. See footnote 65, at p. 731 (1995 legislation “did away with the last remaining federal statutory basis for following the AASHTO guidelines”). To the extent a state’s road design guidelines are similar to those of the Green Book, the discussion below is applicable to those guidelines. See Reid Ewing, *From Highway to My Way*, Planning, Jan. 1, 2001, at 22 (describing some states’ deviation from AASHTO guidelines). (Discussing some states’ rules); Fla. Dep’t of Transportation, *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways* (2005). <http://www.dot.state.fl.us/rddesign/FloridaGreenbook/2005/2005FloridaGreenbook.pdf> (an example of one state’s guidelines), and at 729 (“Most states still use the AASHTO guidelines...”); see also Dan Christensen, *Paving the Way for a Road Hazard Case*, Trial, Jan. 1, 2002, at 47 (“Most states base their highway design regulations on the many AASHTO books and reports published over the last 50 years.”). But see Reid Ewing, *From Highway to My Way*, Planning, Jan. 1, 2001, at 22 (describing some states’ deviation from AASHTO guidelines).

67. See Editorial, *The Right Road*, Hartford Courant, July 15, 2007, at C1, available at 2007 WLNR 13546079 (“In the 1990s, there was a movement across the country to better blend road design into communities...which in planning jargon is called ‘context-sensitive design.’”); *Institute of Transportation Engineers*, *Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities* 3; 2006. <http://www.ite.org/bookstore/RP036.pdf> (“ITE Manual”).

68. See Toni Gold, *New Road Policy Means More Than Pavement*, Hartford Courant, Apr. 16, 2006, at C5, available at 2006 WLNR 7279203 (CSD “recognizes and is sensitive to the context beyond the pavement, be it historic, natural, scenic, or economic”).

69. See Editorial, footnote 67 (CSD seeks “to balance the needs of vehicle movement with those of pedestrians, bicyclists, bus riders, shop owners, and others.”); Brian S. Bochner, *Beyond the Current Envelope—Context-Sensitive Street Design*, 74 *Inst. Transp. Eng’rs J.* 28; 2004, available at 2004 WLNR 11538347 (“Context-sensitive design serves a variety of users—including drivers, pedestrians, bicyclists, the aged and the handicapped and a variety of travel modes, including personal vehicles, trucks, emergency vehicles, bicycles and walking.”).

70. Steve Chambers, *Just Around the Bend: A New Look at Roads*, The Star-Ledger, Nov. 3, 2003, at 13, available at 2003 WLNR 15643704 (one example of CSD was a small New Jersey town’s decision to reduce its downtown main street from four lanes to two, “making it less a speedway and more a thoroughfare of a sleepy downtown”).

71. ITE’s membership includes private-sector consultants and planners as well as government-employed transportation planners. ITE thus tends to be “more receptive to changing entrenched practices than most of the highway-building establishment.” See Alan Ehrenhalt, *The Asphalt Rebellion*, Greensboro News & Record, Apr. 12, 1998, at F1, available at 1998 WLNR 7284176 (“One thing any local board or council knows for sure is that if it builds a road according to AASHTO standards, it will not be sued for design negligence in the event of an accident.”).

72. See ITE Manual, footnote 67, at p. 3 (using terms “context-sensitive design” and “context-sensitive solutions” interchangeably).

73. See footnote 72, at p. ix (listing sponsors).

74. See footnote 73, at p. 10.

While the Green Book seeks to provide guidelines for a wide variety of streets,<sup>75</sup> the ITE Manual seeks only to provide guidance on street design “in places where the qualities of walkable communities are a high priority objective.”<sup>76</sup> Thus, the ITE Manual’s goals are more limited than those of the Green Book.

In response to the CSD movement, AASHTO has also begun to consider the interests of pedestrians and other non-drivers. In 2004, AASHTO published its most recent edition of the Green Book.<sup>77</sup> In its foreword, the 2004 Green Book states: “Emphasis has been placed on the joint use of transportation corridors by pedestrians, cyclists and public transit vehicles. Designers should recognize the implications of this sharing of the transportation corridors and are encouraged to consider not only vehicular movement, but also movement of people [and of goods and services].”<sup>78</sup>

In particular, the Green Book states that in designing “local” urban streets—that is, those serving pedestrians “primarily to provide access to adjacent residential development areas”<sup>79</sup>—a street-builder’s “overriding consideration is to foster a safe and pleasant environment whereas the convenience of the motorist is secondary.”<sup>80</sup> To protect pedestrians, the Green Book recommends sidewalks even in rural and suburban areas,<sup>81</sup> whether those areas are residential<sup>82</sup> or commercial.<sup>83</sup> The Green Book’s section on pedestrian movements even concedes that wide streets create problems for pedestrians, stating: “The wider the street, the longer it takes a pedestrian to cross.”<sup>84</sup>

The Green Book’s street-width rules have also evolved. For example, the Green Book no longer favors the creation of six- and eight-lane streets.<sup>85</sup> Even on arterial streets—the most heavily trafficked, high-speed streets<sup>86</sup>—the Green Book now describes four-lane streets as “normal”<sup>87</sup> and recommends that transportation planners build medians in order to protect pedestrians from heavy traffic on such streets.<sup>88</sup> According to the most recent version of the Green Book, intermediate-scale “collector” streets<sup>89</sup> require only two lanes of moving traffic,<sup>90</sup> and smaller local streets require only one or two lanes.<sup>91</sup> Although the Green Book suggests that twelve-foot lanes are desirable under certain circumstances,<sup>92</sup> it allows lanes as narrow as nine feet on collector streets<sup>93</sup> and eleven feet on arterial streets.<sup>94</sup> Thus, the Green Book no longer forecloses the creation of low-speed, pedestrian-friendly streets.

75. See footnote 49, at p. 728 (until 1991, all federally funded road projects had to comply with Green Book guidelines); see also Sonoma County Report, *supra* 63 (a wide variety of roads are federally funded).

76. ITE Manual, see footnote 67, at p. 10. Some states have also endorsed context-sensitive design. See, e.g., Mass. Highway Dep’t, Project Development & Design Guide 1–4 (2006). <http://www.vhb.com/mhdGuide/mhdGuideBook.asp>.

77. See generally AASHTO 2004, footnote 52.

78. See footnote 77, at p. xlv.

79. See footnote 78, at p. 390.

80. See footnote 79.

81. See footnote 80, at p. 358 (“As a general practice, sidewalks should be constructed along any street or highway not provided with shoulders, even though pedestrian traffic may be light.”) (emphasis added); *id.* at p. 357 (“[S]idewalks in rural areas do reduce pedestrian collisions.”); *id.* at 357 (sidewalks are “often justified” in rural and suburban areas wherever there are “residential areas, schools, local businesses, and industrial plants, that result in pedestrian concentrations”).

82. See footnote 81, at p. 357 (“When suburban residential areas are developed, initial roadway facilities are needed for the development to function, but the construction of sidewalks is sometimes deferred. However, if pedestrian activity is anticipated, sidewalks should be included as part of the construction.”); *id.* at 398 (“In residential areas, sidewalks should be provided on at least one side of all local streets and are desirable on both sides of the street.”); *id.* at p. 436 (“In residential areas, sidewalks are desirable on both sides of collector streets, but should be provided on at least one side.”).

83. See footnote 82 (“Sidewalks should be provided...along all collectors in commercial areas.”) (emphasis added).

84. See footnote 83, at p. 99.

85. See footnote 40, at p. 265.

86. See AASHTO 2004, footnote 52, at p. 469 (“Urban arterials carry large traffic volumes within and through urban areas.”); at 10–12 (comparing arterials to lower-speed “collector” streets and even slower “local” streets).

87. See footnote 86, at p. 473 (“[T]he normal range for urban arterial streets is four to eight lanes.”).

88. See footnote 87, at p. 474 (medians “desirable” on arterial streets). The widest collector streets should also have medians. *Ibid.* at p. 434 (“Urban collector streets designed for four or more lanes should include width for an appropriate median treatment, where practical.”).

89. See footnote 88, at p. 419 (“The collector has aspects of both arterials and local roads and often serves as a connection between them... usually serving moderate traffic volumes.”).

90. See footnote 89, at p. 433 (“Two moving lanes plus additional width for shoulders and parking are sufficient for most urban collector streets.”).

91. See footnote 90, at p. 392 (Where parking is allowed on both sides of a residential street, only “one unobstructed moving lane must be ensured”; however, “[i]n multifamily residential areas, a minimum of two moving traffic lanes to accommodate opposing traffic may be desirable.”).

92. See footnote 91, at p. 311 (12-foot lanes desirable on two-lane, two-way rural highways “when high traffic volumes and particularly high percentages of commercial vehicles are expected”).

93. See footnote 92 (“Lane widths of 2.7–3.6 m [9–12 ft] are generally used...”).

94. See footnote 93, at p. 472 (“Lane widths of 3.3 m [11 ft] are used quite extensively for urban arterial street designs.” Even 10-foot lanes may be appropriate on arterials, but only in “areas having little or no truck traffic.”).

The Green Book, however, continues to disfavor pedestrians in some important respects. The Green Book creates a hierarchy of streets<sup>95</sup>; freeways and arterials should be the widest streets<sup>96</sup> with the heaviest traffic;<sup>97</sup> vehicles then exit freeways and arterial streets to enter collector streets that penetrate neighborhoods<sup>98</sup> and then exit the collector streets to enter quieter, local streets.<sup>99</sup> The Green Book states that the collector-street system “collects traffic from local streets in residential neighborhoods and channels it into the arterial system,”<sup>100</sup> which implies that local streets are purely residential and that streets with other land uses should be collectors and arterials. Residential streets, as a result, “feed broad connector streets, which, in turn, feed busy multilane arterials.”<sup>101</sup>

This street hierarchy creates a subtle bias in favor of separating housing from commerce: if the busiest streets are typically arterials, major commercial streets, as the busiest streets, will thus be arterials.<sup>102</sup> Because commercial streets (a) are usually arterial and (b) usually intersect with collector streets, a resident of a local street, therefore, might have to walk across two types of streets—his own local street and a collector street—to reach a shop or job located on an arterial street. It follows that transportation planners who adopt the Green Book’s hierarchical street design may increase the distance between housing and commerce, which discourages people from walking from their homes to jobs and shops.<sup>103</sup>

The Green Book also continues to encourage high-speed driving in a variety of ways. By favoring high speeds on commercial, collector, and arterial streets, the Green Book causes businesses to be placed on high-speed streets. The Green Book states that the design speed<sup>104</sup> for urban arterials should be thirty to sixty miles per hour<sup>105</sup> and similarly states that “a design speed of 50 km/h [30 mph] or higher should be used for urban collector streets,”<sup>106</sup> thereby implying that cars should move almost as rapidly on collector streets as on arterials.

Moreover, a variety of other Green Book provisions encourage road designers to err on the high end of acceptable design-speed ranges: that is, to build streets that accommodate sixty-mile-per-hour traffic rather than thirty-mile-per-hour traffic. The Green Book states that as a general matter, streets should “be designed to operate at a speed that satisfies nearly all drivers,”<sup>107</sup> though presumably not all pedestrians or bicyclists, and that “every effort should be made to use as high a design speed as practical.”<sup>108</sup>

One factor used in determining appropriate street design is likely traffic volume. According to the Green Book, high-traffic streets should be designed for higher speeds, and roads with less traffic should be designed for lower speeds.<sup>109</sup> For example, a high-traffic collector street should be wider than a low-traffic collector, regardless of its classification as local, collector, or arterial.<sup>110</sup> Accordingly, the busiest streets will typically be the widest, which increases the risk that streets with large numbers of jobs and shops will be too wide for pedestrians to use with safety and comfort.

The Green Book does not recommend, however, designing streets for average traffic volumes or even average rush-hour traffic volumes, because such design would be inadequate to handle rush-hour traffic on the days when congestion is at its highest.<sup>111</sup> The Green Book instead advocates that roads should be designed for “the 30th highest hourly volume of

95. See footnote 94, at p. 1 (using the term “movement hierarchy” to describe types of streets, ranging from highest volume streets to lowest volume streets).

96. See footnotes 86–91 and accompanying text.

97. See AASHTO 2004, footnote 52, at p. 11 (urban arterial system serves “the highest traffic volume corridors”).

98. See footnote 97, at p. 419 (“Collector streets link neighborhoods... with the arterial street system,” thus serving “traffic movements between arterials and local streets.”).

99. See footnote 98, at p. 1.

100. See footnote 99, at p. 12.

101. Editorial, *Neighborhoods Reborn*, Consumer Reports, May 1, 1996, at 25, available at 1996 WLNR 243157.

102. We note that arterial streets are generally not limited-access freeways. Rather, the Green Book contemplates that arterials will include commercial or residential development. See, e.g., AASHTO 2004, footnote 52, at p. 469 (“Development along an arterial should be anticipated regardless of a city’s size.”).

103. See ITE Manual, footnote 67, at p. 11 (noting that communities are more walkable if “[m]ixed land uses [are] in close proximity to one another”).

104. Design speed is the “speed used to design the various geometric design features of the roadway.” AASHTO 2004, See footnote 52, at p. 67.

105. See footnote 104, at p. 470 (“Design speeds for urban arterials generally range from 50 to 100 km/h [30 to 60 mph].”).

106. See footnote 105, at p. 430 (emphasis added).

107. See footnote 106, at p. 66.

108. See footnote 107, at p. 67.

109. See footnote 108, at pp. 389–90 (indicating that lower design speeds are appropriate on low-volume residential streets).

110. See footnote 109, at p. 433 (providing that even though two moving traffic lanes are sufficient for most collector streets, the “number of lanes to be provided on urban collector streets with high traffic volumes should be determined from a capacity analysis”). Admittedly, “likely pedestrian presence” is one of the factors that should be used in deciding the appropriate design speed for collectors. *Ibid.* at p. 430. However, this is just one of a number of relevant factors. *Id.* (adding that road designers should also consider “available right-of-way, terrain, adjacent development...and other site controls”). Thus, collectors may be designed for high speeds even if they are used by pedestrians.

111. See footnote 110, at p. 59.

the year.”<sup>112</sup> Because each year is made up of 8760 hours,<sup>113</sup> roads will reach this hourly- volume rule less than one half of one percent of the time. This “thirty-hour rule” is not based on existing traffic volumes, but on “traffic volumes for a 20-year design period.”<sup>114</sup> Consequently, if transportation planners conclude that a road is likely to become crowded over time, they can design it to accommodate more traffic than the road will have for decades. The Green Book, then, effectively recommends designing roads large enough to handle the worst-case scenario twenty years after the road’s construction. If highway planners determine that an eight-lane road is necessary to handle rush-hour traffic on the busiest days in 2028, they will build the eight-lane road even if a narrower road is presently adequate or will be adequate for years in the future.<sup>115</sup>

The Green Book also continues to disfavor the creation of on-street parking on arterial streets,<sup>116</sup> even though on-street parking may well reduce the potential for pedestrian-vehicle collisions. On-street parking creates a buffer zone between moving vehicles and pedestrians, which may effectively reduce pedestrian fatalities.<sup>117</sup> If a pedestrian must cross a four-lane street without on-street parking, she must walk through four lanes of traffic.

The Green Book states that “[z]oning regulations should require ample off-street parking as a condition for approval of a building permit” to build near arterial streets.<sup>118</sup> Where parking is off-street, buildings are typically surrounded by parking lots,<sup>119</sup> which in turn means that pedestrians have longer and more dangerous trips to those buildings than they otherwise might. To reach a shop or job surrounded by parking lots, pedestrians must not only cross streets, but must also cross through the parking lot and dodge vehicles traveling through that parking lot.<sup>120</sup>

The Green Book’s insistence on off-street parking effectively widens streets and increases pedestrian exposure to auto traffic in two ways: (1) it advocates the removal of on-street parking that protects pedestrians from fast-moving cars, and (2) it forces landowners and business owners to create off-street parking lots that separate pedestrians from their destinations.<sup>121</sup>

Government-mandated off-street parking impairs pedestrian comfort as well as pedestrian safety. The “strip mall landscapes” created by parking lots are as aesthetically unappealing as they are inconvenient: off-street parking in front of

112. See footnote 111.

113. Twenty-four (the number of hours in a day) multiplied by 365 (the number of days in a year) equals 8760.

114. AASHTO 2004, see footnote, at p. 65.

115. See, e.g., *Conservation Law Found. v. Fed. Highway Admin.*, No. 06- CV-45-PB, 2007 WL 2492737, at \*27 (D.N.H. Aug. 30, 2007) (allowing government to widen a road from two lanes in each direction to four lanes in each direction, based on projections of 2020 traffic).

116. AASHTO 2004, see footnote 52, at p. 373 (asserting that on-street parking “decreases through-traffic capacity, impedes traffic flow, and increases crash potential”).

117. See Frank Jaskiewicz, *Pedestrian Level of Service Based on Trip Quality G-1/6*. [http://onlinepubs.trb.org/onlinepubs/circulars/ec019/Ec019\\_g1.pdf](http://onlinepubs.trb.org/onlinepubs/circulars/ec019/Ec019_g1.pdf) (On-street parking “serves as a continuous solid barrier between pedestrians and fast-moving vehicles.”).

118. AASHTO 2004, see footnote 52, at p. 483.

119. This is assuming, of course, that such parking is aboveground. It could be argued that rather than encouraging on-street parking, governments should require landowners to install underground parking because such parking does not inconvenience pedestrians as much as aboveground parking lots and does not endanger bicyclists as much as on-street parking. However, underground parking is more costly than aboveground parking, and thus it is unlikely to be adopted everywhere unless a government wishes to impose the additional costs of building parking lots underground on landowners-costs, which in turn may be passed on to the rest of society in the form of higher prices for goods and services. See Donald C. Shoup, *The High Cost of Free Parking* 2, 148–51; 2005 (pointing out that landowners may pass costs of parking lot construction on to consumers, and citing examples of housing developments in which parking increased construction costs by more than 30%); Nancy Sarnoff & David Kaplan, *This Luxury Is for Display Purposes Only: Full-Scale Models Aim to Sell Condos Before They Have Even Been Built*, *Houston Chron.*, Aug. 26, 2007, at 3, available at 2007 WLNR 16663162 (quoting developer’s assertion that underground parking makes mixed-use developments more costly than other forms of development).

120. See footnote 40, at p. 280.

121. On the other hand, it could be argued that on-street parking decreases bicyclist safety because when a driver opens the door of a parked car there is some risk that a bicyclist could crash into that door. See Dennis Hoey, *Cape’s Town Center Plan Moves Forward: The Planning Board Endorses a Strict Set of Zoning Rules for the Pond Cove Commercial District*, *Portland Press Herald*, Oct. 24, 1994, at 1B, available at 1994 WLNR 4001992 (noting that “drivers opening doors present a hazard to bicyclists”); Wayne Pein, *Bicycling and On-Street Parallel Parking* 1; 2003. Available at: [http://www.humantransport.org/bicycledriving/library/door zone.pdf](http://www.humantransport.org/bicycledriving/library/door%20zone.pdf) (discussing the problem that open doors might injure bicyclists). However, this problem can be resolved by installing markings that communicate the location of “door zones” (that is, areas within a door’s width of parked vehicles), thus encouraging bicyclists to avoid those zones. *Id.* at p. 1, 3. Alternatively, on-street parking could be diagonal rather than horizontal, thus eliminating the risk of “doorings”; even though bicyclists might face a risk of colliding with cars pulling in and out of diagonal parking spaces, those cars might move more slowly than an opening door. *Id.* at p. 1. Finally, bicycle lanes could be installed on the left side of streets, far away from off-street parking. In any event, the harm caused by dooring may well be outweighed by the danger to bicyclists from increased automobile speeds in the absence of off-street parking; by narrowing streets, on-street parking effectively slows traffic, reducing the risk of a major accident. See footnote 117 and accompanying text; Cindy Larson, *A Return to Old-Fashioned Neighborhoods: Carmel Joins Housing with Commercial District*, *Fort Wayne News Sentinel*, Dec. 30, 2003, at 1A, available at 2003 WLNR 14401372 (indicating that on-street parking “serves to slow down traffic, making the neighborhood more conducive to walking and biking”); Iowa Dep’t of Transportation, *Angle Parking on Iowa’s Low Volume Primary Extensions in Small Towns: Final Report 9/2003*. Available at: <http://publications.iowa.gov/archive/00002630/01/angleparkingsafety.pdf> (“[W]hen average crash rates for various parking types were compared,” it was observed that rates for areas with diagonal and parallel on-street parking “were less than sample locations with no parking at all.”). But see *id.* at 2 (noting studies on both sides of issue).



buildings restricts a pedestrian's immediate view to the parking lot only.<sup>122</sup> By contrast, on-street parking allows sidewalks to border storefronts and other land uses more visually appealing than parking lots.<sup>123</sup>

Because land devoted to parking cannot be devoted to housing or businesses, off-street parking artificially disperses traditionally populated areas. For example, in 1961, Oakland, California, began to require apartment buildings to provide parking spaces for their tenants.<sup>124</sup> Within three years, the number of apartments per acre in Oakland fell by thirty percent.<sup>125</sup> Government-mandated low-density areas result in fewer residences and businesses per acre, which in turn means that fewer of these destinations can be placed within a short walk of each other.<sup>126</sup> In other words, by reducing population density, off-street parking also reduces walkability.

The Green Book also disfavors street trees,<sup>127</sup> stating that even on collector streets, "obstacles, such as trees, that might seriously damage out-of-control vehicles should be removed wherever practical."<sup>128</sup> Street trees, however, may actually enhance safety for both drivers and pedestrians by giving drivers the impression that a street has a defined edge,<sup>129</sup> which could slow traffic and reduce the number and severity of accidents.<sup>130</sup> Street trees also make walking more comfortable by protecting pedestrians from sun and rain.<sup>131</sup>

## Comment

The Green Book still encourages the creation of high-speed streets that are uncomfortable and unsafe for pedestrians, both through its specific recommendations and its overall bias in favor of high-speed traffic. It is important to note, though, that the Green Book's most anti-pedestrian provisions do not set forth mandatory rules that bind transportation planners. The foreword in the most recent version of the Green Book states that it is "not intended to be a detailed design manual that could super[s]ede the need for the application of sound principles by the knowledgeable design professional. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations."<sup>132</sup>

## TORT LAW AND TRAFFIC: THE RISE AND FALL OF SOVEREIGN IMMUNITY

With an introduction to highway design in place, we now turn to a study of the litigation associated with it, in particular *sovereign immunity* and *design immunity*. At British common law, the government could not be sued because "the king was considered immune from suit in his own courts absent his consent."<sup>133</sup> American courts adopted a similar view,<sup>134</sup> but in the second half of the twentieth century, states became more willing to subject themselves and their municipalities to suit.<sup>135</sup>

122. See footnote 40, at p. 280.

123. See footnote 122.

124. See Shoup, footnote 119, at p. 143.

125. See footnote 124, at p. 143-44.

126. See Katharine B. Silbaugh, Wal-Mart's Other Woman Problem: Sprawl and Work-Family Balance, 39 Conn. L. Rev. 1713, 1717; 2007 ("Pedestrians can be found in places where density and mixed-use zoning create short trips."); Maureen Klover, The Nexus Between Sprawl, Neighborhood Effects and Urban Crime, 11 Geo. Pub. Pol'y L. Rev. 35, 42; 2006 (only "densities above 3500 [persons per square mile] are sufficient to support public transportation, small retail, and pedestrian traffic").

127. "Street trees" are trees planted between streets and sidewalks. See Ruthmarie Shea, Whose Tree Is It Anyway? A Case of First Impression, 77 U. Det. Mercy L. Rev. 579, 580; 2000.

128. AASHTO 2004, See footnote 52, at p. 437; see also *Ibid* at p. 481 (recommending that urban arterials be "clear" of obstructions). On the other hand, the Green Book states that "the potential benefits of removing such obstacles should be weighed against the adverse environmental and aesthetic effects of their removal. Therefore, trees should be removed only when considered essential for safety." *Ibid* at p. 437. This statement means that not all existing street trees need be removed; however, the Green Book certainly does not encourage cities to plant any new street trees. As such, the Green Book seems to favor reduction of street trees.

129. Dan Burden, 22 Benefits of Urban Street Trees 4; 2006. Available at: <http://www.ufe.org/files/pubs/22BenefitsofUrbanStreetTrees.pdf>.

130. See footnote 129, at p. 4, 13 (noting that street trees reduce motorist speed).

131. See footnote 130, at p. 5, 11.

132. AASHTO 2004, see footnote 52, at p. xliii.

133. James F. Caputo, Note, Copy-Katz: Sovereign Immunity, the Intellectual Property Clause, and Central Virginia Community College v. Katz, 95 Geo. L.J. 1911, 1914; 2007.

134. See Debra L. Stephens & Bryan P. Harnetiaux, The Value of Government Tort Liability: Washington State's Journey From Immunity to Accountability, 30 Seattle U. L. REV. 35, 37; 2006 ("From the formation of the United States, both the federal government and the several states adopted the notion of sovereign immunity that had prevailed in England since ancient times."); Dan B. Dobbs, The Law of Torts § 269; 2000 (noting that municipalities are also generally immune from tort suit at common law).

135. See Margaret R. Solis, Note, Municipal Law-How Broad a Remedy? Municipal Liability and the Massachusetts Civil Rights Act, 29 W. New Eng. L. Rev. 841, 871; 2007 ("During the 1960s and 1970s, a number of states modified their common law rules of sovereign immunity to allow suits against municipalities, the state, or both.")

Today, only three states retain traditional sovereign immunity.<sup>136</sup> With the decline of sovereign immunity in recent decades, claims against state and local transportation agencies have increased.<sup>137</sup>

As a rule, transportation agencies owe a duty to the public to maintain roads and streets in a reasonably safe condition.<sup>138</sup> Injured motorists will often claim that roads not in compliance with AASHTO guidelines are not “reasonably safe” and that transportation agencies that build and maintain those roads are negligent.<sup>139</sup> Thus, government agencies have had strong incentive to conform to AASHTO guidelines as a way to avoid tort liability.

In *Hussey v. Russell*,<sup>140</sup> numerous drivers and passengers were injured in a two-car collision and subsequently sued the state department of transportation for negligent street design.<sup>141</sup> The plaintiffs’ expert concluded that the state’s failure to follow AASHTO guidelines was a contributing cause of the accident. He explained that according to AASHTO maintenance manuals, road shoulders near curves should be reinforced with additional paving to prevent motorists from veering off the pavement.<sup>142</sup> After discussing other expert testimony unrelated to AASHTO guidelines,<sup>143</sup> a Louisiana appellate court held that “there was a reasonable basis upon which the trial court could have found fault on the part of [the Louisiana Department of Transportation and Development].”<sup>144</sup> Hussey supports the view that a government agency that deviates from AASHTO guidelines is, all other factors being equal, more likely to be held negligent.

In theory, the growth of tort liability for negligent road design could have justified making streets more pedestrian-friendly. For instance, if governments were worried about pedestrians bringing suit when high-speed traffic caused a car to injure a pedestrian, policy decisions might weigh in favor of creating more pedestrian-friendly streets.<sup>145</sup> But transportation planners who build high-speed streets are often acting in compliance with AASHTO guidelines, and as a result are unlikely to be found negligent.<sup>146</sup> By contrast, a planner who builds a more pedestrian-friendly street than the Green Book recommends may face a lawsuit when a speeding motorist is injured on a street designed for low-speed traffic. For example, the motorist might argue that, pursuant to the Green Book, the street should have been wider and that if the street had been wider he would not have been injured.

## ANALYSIS: DOES TORT LAW REALLY MANDATE HIGH-SPEED STREET DESIGN?

Transportation planners follow AASHTO guidelines—at least in part—to avoid the following “nightmare scenario”: a planner ignores AASHTO guidelines when she allows on-street parking to create a buffer zone between pedestrians and moving cars.<sup>147</sup> A motorist crashes into a parked car and sues the government, alleging that the government’s failure to widen the street or remove on-street parking negligently caused the collision. The court finds for the driver, holding that the government’s noncompliance with AASHTO guidelines is evidence of negligence. This concern, however, does not justify the creation of streets that are unsafe or uncomfortable for pedestrians, for two reasons. First, governments are often immune from tort liability for street design under the “discretionary function” doctrine. Second, AASHTO guidelines provide street designers with considerable flexibility.

136. See Dobbs, footnote 134, B 268, at pp. 716–7 (stating that only Alabama, South Dakota, and Wisconsin prohibit suits against the state).

137. See Jay L. Smith et al., Transp. Research Bd., Transportation Tort Law: A Look Forward 1. Available at: <http://onlinepubs.trb.org/onlinepubs/millennium/00133.pdf> (“[S]tate and local transportation agencies are experiencing a dramatic increase in tort litigation involving claims for personal injury and property damage.... The single greatest reason for the explosion of claims against state and local transportation agencies over the last 50 years has been the abolition of the doctrine of [sovereign immunity] by most states.”).

138. See footnote 137, at p. 2.

139. See footnote 138 (even though governments lack “resources to immediately bring all older roads and bridges up to current AASHTO guidelines[,] [t]he issue of AASHTO guidelines... is raised often by plaintiff attorneys in an effort to establish negligence on the part of transportation departments”).

140. 934 So. 2d 766, 768 (La. Ct. App. 2006).

141. See footnote 140.

142. See footnote 141, at p. 773.

143. See footnote 142, at p. 774 (same witness criticized the road’s “undulating” curve, which made driving more difficult, as well as the road’s high “shoulder drop-off”); *Ibid* at p. 773 (citing another witness’s testimony that the road suffered from “puddling of water” and “uneven surface” as well as factors cited by the first witness).

144. See footnote 143, at p. 775.

145. See footnotes 48–58 and accompanying text (describing negative side effects of streets designed to accommodate high speeds); Joey Ledford, The Lane Ranger: Speeding Cars Terrify Neighborhoods, Atlanta J.-Const., Aug. 27, 1997, at B, available at 1997 WLNR 3173969 (“At 20mph, it takes you 20feet to react [to a pedestrian or vehicle in the street] and another 20feet to stop. At 40mph, it’s 40feet to think and another 80feet to stop.”).

146. See footnote 139–43 and accompanying text (compliance with AASHTO guidelines may reduce likelihood of tort liability).

147. See footnote 42 (explaining the benefits of on-street parking).



## DISCRETIONARY FUNCTION IMMUNITY

In the majority of states, governments are at least partially immune from liability for highway design because governments are generally not liable for negligent decisions arising from “discretionary” government activities, and policy decisions concerning street design are considered discretionary.<sup>148</sup>

The creation of narrow, pedestrian-oriented streets is a “discretionary” decision immune from tort liability for the following three reasons: (1) courts have held that broad policy decisions—such as a decision to emphasize pedestrian safety at the expense of vehicle speed—are protected under discretionary immunity;<sup>149</sup> (2) case law supports the proposition that a government’s decision to allow pro-pedestrian street features such as on-street parking and narrower streets is discretionary in nature;<sup>150</sup> (3) courts may rely on ITE guidelines to support the view that transportation planners may reasonably adopt pro-pedestrian features.<sup>151</sup> Each of these reasons will be addressed below.

## THE “BROAD POLICY FACTORS” TEST

As a general matter, a government decision is “discretionary” only when “broad policy factors were involved in reaching the allegedly negligent decision.”<sup>152</sup> Such “broad policy factors” are clearly present where a government official is consciously choosing to design streets that are slower but safer for pedestrians and bicyclists: the official is weighing the policy of protecting non-drivers’ safety against the policy of facilitating fast driving. Consequently, government decisions motivated by the goal of protecting non-drivers from speeding traffic should be treated as discretionary and immune from liability.

## RELEVANT CASE LAW

*Cases applying the discretionary function doctrine have repeatedly allowed government officials to design narrower or more pedestrian-oriented streets.* In *Mitchell v. State*,<sup>153</sup> the plaintiff was injured in a car crash and claimed the collision was the result of defective road design. A New York appellate court held that “[t]here was no showing that the road could not be traversed safely at its 35-mile-per-hour speed limit... Cook Road was generally in good condition, despite its narrowness.”<sup>154</sup> *Mitchell* stands for the proposition that a road can be safely designed even if it is “narrow” and fit only for a speed limit of thirty-five miles per hour.

148. See *Miller v. Nebraska*, 302 N.W.2d 692, 694 (Neb. 1981) (Boslaugh, J., concurring), overruled on other grounds by *Blitzkie v. Nebraska*, 422 N.W.2d 773, 774 (Neb. 1988) (“[T]he majority of the cases which have considered this issue support a rule that, generally, highway design involves a discretionary function.”). An American Law Reports annotation cites decisions from over a dozen states in support of this proposition, and this list is by no means exhaustive. See Don F. Vaccaro, Annotation, Liability of Governmental Entity or Public Officer for Personal Injury or Damages Arising out of Vehicular Accident Due to Negligent or Defective Design of a Highway, 45 A.L.R.3d 875, 885–87; 1972 (citing cases from Connecticut, Georgia, Idaho, Iowa, Kansas, Kentucky, Maryland, Minnesota, Missouri, Nebraska, New Jersey, North Carolina, and Tennessee); *Taylor v. Shoemaker*, 605 So. 2d 828, 831–33 (Ala. 1992) (discretionary function immunity protects individual government employees as well as those of government as a whole); *Medina v. State*, 35 P.3d 443, 456 (Colo. 2001) (Colorado law waives sovereign immunity for failure to maintain roads in existing conditions, but “does not waive immunity in an action to recover for injuries solely attributable to design”); *Greenwood v. Easton*, 828 N.E.2d 945, 949 n.6 (Mass. 2005) (highway design is a discretionary function); *Valescu v. Cleveland Metroparks Sys.*, 630 N.E.2d 1, 4 (Ohio Ct. App. 1993) (“[T]he design of the road itself is a planning function of the political subdivision, entitling the subdivision to immunity as to liability arising from the design.” (citation omitted)); *Mann v. McCullough*, 26 P.3d 856, 859 (Or. Ct. App. 2001) (stating that although not all design decisions are immune, such decisions are “discretionary” and thus immune when “room for policy judgment” is involved); *Rendine v. Flanders*, No. 80–3334, 1986 WL 714227, at \*2 (R.I. Super. June 3, 1986) (highway “planning and design” discretionary and thus immune from liability); *Wulf v. Senst*, 669 N.W.2d 135, 143 (S.D. 2003) (“sovereign immunity applies to design of a highway” (citation omitted)); *Carter v. Chesterfield County Health Comm’n*, 527 S.E.2d 783, 786 (Va. 2000) (“[We] have held that municipalities are immune from tort liability based on allegations of negligence in the design of roads or streets...” (citations omitted)). Some states have even created blanket statutory immunity for purposeful highway design decisions. See N.M. Stat. Ann. § 41-4-11(B)(1) (West, Westlaw through 2009 First Regular Sess.) (in New Mexico, immunity applies to “a defect in plan or design of any bridge, culvert, highway, roadway, street, alley, sidewalk or parking area”); S.C. Code Ann. § 15-78-60(15) (2005) (in South Carolina, governments “are not liable for the design of highways and other public ways”); Vt. Stat. Ann. tit. 12, § 5601(e)(8) (2002) (in Vermont, immunity is not waived for “claim arising from the selection of or purposeful deviation from a particular set of standards for the planning and design of highways”); Wyo. Stat. Ann. § 1-39-120(a) (i) (2007) (Wyoming’s waiver of sovereign immunity does not extend to “defect in the plan or design of any bridge, culvert, highway, roadway, street, alley, sidewalk or parking area.”).

149. See footnotes 156–171 and accompanying text.

150. See footnotes 162–171 and accompanying text.

151. See footnotes 172–183 and accompanying text.

152. *Breed v. Shaner*, 562 P.2d 436, 443 (Haw. 1977).

153. 486 N.Y.S.2d 97 (N.Y. App. Div. 1985).

154. See footnote 153, at p. 99.

It could be argued that a governmental decision to set a low speed limit may itself be negligent because governments have a duty to make roads safe for fast drivers. A California court rejected this argument, however, in *Fuller v. Department of Transportation*.<sup>155</sup> In *Fuller*, the court held that the setting of a speed limit was subject to discretionary immunity because “[d]esign speed,” such as the safe speed at which a curve may be negotiated, is an inherent part of roadway design. The speeds at which vehicles travel, and speed regulations, are part and parcel of the safety features of a road improvement.”<sup>156</sup> Speed-related decisions, therefore, are subject to “*design immunity* analysis.”<sup>157</sup> By suggesting that “the safe speed at which a curve may be negotiated”<sup>158</sup> is discretionary, the court implied that any government decisions related to speed are protected by discretionary immunity. It logically follows that if a city or state decides that a street should be designed for twenty-five-mile-per-hour traffic instead of fifty-mile-per-hour traffic, that decision will be protected by discretionary immunity.<sup>159</sup>

*Mitchell* is not the only case finding that a narrowly designed government road is reasonably safe for vehicular, pedestrian, and bicyclist traffic. In *Stewart v. State*,<sup>160</sup> the Washington Supreme Court held that a road was negligently designed because of inadequate lighting<sup>161</sup> but added in dicta: “The decisions to build the freeway, to place it in this particular location... the number of lanes—these elements involve a basic governmental policy, program or objective” and as such are discretionary.<sup>162</sup> Based on the holding in *Stewart*, government decisions regarding the number of lanes on a street should be regarded as discretionary and immune from liability.

Street width is not the only pedestrian-safety issue insulated from liability through discretionary function immunity. As noted above, on-street parking may make streets safer for pedestrians.<sup>163</sup> In *Sorenson v. Manchester*, the New Hampshire Supreme Court held that a city’s decision to allow on-street parking was protected by discretionary immunity.<sup>164</sup> The plaintiff’s husband in *Sorenson* was killed when his motorcycle collided with a van that was stopped in the middle of the street while waiting to make a turn.<sup>165</sup> The plaintiff claimed “the city was negligent in permitting both two-way traffic and parking on [that street], thereby reducing the portion of roadway available for moving traffic to such an extent that it was unsafe for travel.”<sup>166</sup> In other words, by permitting both two-way traffic and on-street parking, the city allegedly made the road less safe. The court rejected the plaintiff’s argument, holding that decisions related to parking regulation “rest on the exercise of judgment and discretion and represent planning and policymaking... [and thus] fit squarely within the category of discretionary functions entitled to municipal immunity.”<sup>167</sup> *Sorenson* therefore stands for the proposition that decisions relating to on-street parking are discretionary and accordingly immune from liability.

As previously noted, the installation of street trees may also make a street more comfortable for pedestrians by slowing traffic and protecting pedestrians from harsh weather.<sup>168</sup> This decision is also protected by discretionary immunity. In *Sims v. Newark*,<sup>169</sup> the plaintiffs were injured when their car was struck by a decaying tree limb as a result of the city’s negligent maintenance of street trees.<sup>170</sup> The court held that because “[t]ree pruning and removal... involves discretionary decisions at every phase of the process... The city has immunity when exercising judgment or discretion in its maintenance of trees.”<sup>171</sup> If tree removal is discretionary, it logically follows that tree installation is equally discretionary and thus immune from liability.

155. 107 Cal. Rptr. 2d 823 (Cal. Ct. App. 2001).

156. See footnote 155, at p. 827 (footnote omitted).

157. See footnote 156.

158. See footnote 157.

159. Admittedly, the *Fuller* court distinguished other California cases finding negligence where roads were allegedly unsafe at existing speed limits. See *Ibid* at p. 829. But in the cases cited, government officials were on notice that the roads in question were dangerously designed. *Ibid* at p. 828 (in one such case, “there was a triable issue of fact whether the public entity had notice, in the 1 month of the road’s use, that it was in a dangerous condition as designed”). Similarly, in another case cited, “the critical issue was notice of a dangerous condition of the roadway.” *Ibid* at p. 828; see also footnotes 197–98 and accompanying text (explaining why “notice” theory of liability does not bar officials from designing slow-traffic streets). And even if speed limits were not a discretionary function, governments would be as likely to be liable for designing dangerously high-speed streets as for designing relatively calm streets. *Fuller*, 107 Cal. Rptr. 2d at 828 (describing a case in which a municipality was liable where the speed limit was 65 miles per hour and the street could not be safely navigated at such a high speed).

160. 597 P.2d 101, 106 (Wash. 1979).

161. See footnote 160.

162. See footnote 161. (Emphasis added).

163. See footnotes 116–17 and accompanying text (discussing benefits of on-street parking). But see footnote 121 (expressing concerns about effects of on-street parking on bicyclists).

164. 621 A.2d 438, 440 (N.H. 1993).

165. See footnote 164, at p. 438.

166. See footnote 165, at p. 439.

167. See footnote 166, at p. 439–40.

168. See footnote 129 (noting that street trees reduce motorist speed).

169. 581 A.2d 524 (N.J. Super. Ct. Law Div. 1990).

170. See footnote 169, at p. 525.

171. See footnote 170, at p. 529–30.

## THE ROLE OF INSTITUTE OF TRANSPORTATION ENGINEERS GUIDELINES

*Just as compliance with AASHTO guidelines may reduce a government's risk of tort liability, compliance with ITE guidelines may have similar effects.* In *James v. New York State Bridge Authority*,<sup>172</sup> the plaintiff's husband was killed while driving on a curve with a fifty-five-mile-per-hour speed limit. The plaintiff claimed the state was negligent in failing to set a lower speed limit.<sup>173</sup> A New York appellate court held that the state's decision was entitled to discretionary immunity because the state based its decision on a report by an engineering firm about the speed limit's safety, and that report was based on ITE studies.<sup>174</sup> *James* accordingly stands for the proposition that compliance with ITE studies or guidelines, like compliance with the Green Book, is evidence that roads were maintained in a reasonably safe condition.<sup>175</sup>

As noted above, ITE recently drafted guidelines favoring pedestrian-oriented, context-sensitive design.<sup>176</sup> ITE recommends that mixed-use urban streets have a design speed of thirty to forty miles per hour,<sup>177</sup> a range at the low end of the Green Book guidelines, which recommend design speeds of thirty to sixty miles per hour for urban arterials.<sup>178</sup> While the Green Book urges street-builders to use as high a design speed as practical,<sup>179</sup> ITE emphasizes that "adequate service levels can be maintained in urban areas with lower operating and design speeds."<sup>180</sup> While the Green Book further discourages on-street parking,<sup>181</sup> ITE's manual lists the advantages of on-street parking as well as the disadvantages<sup>182</sup> and asserts that government design "needs to balance traffic capacity and local access needs when deciding where and when to permit on-street parking."<sup>183</sup> Because courts defer to ITE's recommendations as well as those of AASHTO, a government agency that disregards AASHTO guidelines in order to create more pedestrian-friendly streets is likely to avoid tort liability if its decision is supported by the ITE guidelines.

## CAN AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS GUIDELINES PREVENT RELIANCE ON DISCRETIONARY IMMUNITY?

The immunity-related cases cited above did not mention government deviations from AASHTO guidelines. It could be argued, therefore, that transportation planners are not immune from tort liability if they have chosen to disregard AASHTO guidelines, even if planners' decisions were based on the broad policy of making streets safer and more comfortable for pedestrians.

In *State v. Day*,<sup>184</sup> the plaintiff was injured in a car crash because of the state's alleged violation of AASHTO guidelines.<sup>185</sup> A Texas appellate court held that the relevant "AASHTO manual does not create a mandatory duty with regard to the design of the intersection in question; the manual itself provides that the specifications do not create absolute, non-discretionary standards."<sup>186</sup> In other words, the state "had discretion to design the highway contrary to the specifications set out in the

172. 743 N.Y.S.2d 151 (N.Y. App. Div. 2002).

173. See footnote 172, at p. 152 (plaintiff alleged that a state agency "was negligent in failing to provide safe speed limits"; the court noted in the opinion that the government "raised the speed limit on the subject curve from 40 miles per hour to 55 miles per hour").

174. See footnote 173, at p. 153.

175. Similarly, where state street-design guidelines favor more pedestrian-friendly design, those guidelines are also entitled to judicial deference. See ITE Manual, footnote 67, at p. 10 (noting that some local and state agencies have adopted ITE principles as policies or mandates); Mass. Highway Dep't, See footnote 78, at 1.1; *Ostendorf v. Kenyon*, 347 N.W.2d 834, 838 (Minn. Ct. App. 1984) (state likely to be immune from suit when it complies with its own manuals).

176. See, e.g., ITE Manual, footnote 67 and accompanying text.

177. See footnote 176, at p. 90 ("[d]esign speed ranges from 30 to 40 mph").

178. See footnote 177 (proposed design speeds are at "a range consistent [with], but somewhat lower than, the higher end of AASHTO's recommended range for urban arterial streets"); AASHTO 2004, see footnote 53, at p. 470 ("Design speeds for urban arterials generally range from...30 to 60 mph...").

179. AASHTO 2004, see footnote 52, at p. 67.

180. ITE Manual, see footnote 67, at p. 91.

181. See AASHTO 2004, footnote 52, at p. 373 (asserting that on-street parking "decreases through-traffic capacity, impedes traffic flow, and increases crash potential"); *ibid.*, at p. 483 (stating that "[z]oning regulations should require ample off-street parking as a condition for approval of a building permit").

182. See ITE Manual, footnote 67, at p. 130-1 (listing advantages); *ibid.* at p. 132 (noting that on-street parking "can result in a 3%-30% decrease in the capacity of the adjacent travel lane").

183. See footnote 182, at p. 132.

184. No. 09-02-177, 2002WL 31525359, at \*1 (Tex. App. Nov. 14, 2002).

185. See footnote 184, at \*2 (plaintiff claimed that a driver approaching the intersection where the accident occurred would not "have the minimum sight distance required by AASHTO").

186. See footnote 185. The same is true of the current Green Book. See AASHTO 2004, footnote 52, at p. xliii ("Sufficient flexibility is permitted to encourage independent designs tailored to particular situations.").

AASHTO manual.”<sup>187</sup> Because Day applied discretionary immunity despite the state’s rejection of AASHTO guidelines, it supports the proposition that discretionary immunity protects policy decisions that deviate from Green Book standards.

Similarly, in *Schmitz v. Dubuque*,<sup>188</sup> the plaintiff was injured on a bicycle/walking trail and sued the city for negligently designing the trail.<sup>189</sup> The Iowa Supreme Court noted that the trail violated AASHTO standards<sup>190</sup> but nevertheless addressed the merits of the city’s contention that “irrespective of any negligence, it cannot be held liable because the acts complained of by plaintiff were discretionary.”<sup>191</sup> In considering the city’s discretionary immunity defense, Schmitz implicitly held that a government agency that disregards AASHTO guidelines may nevertheless rely on the discretionary immunity defense.

At first glance it might appear that *Corso v. Laborde*<sup>192</sup> is to the contrary. In *Corso*, a plaintiff’s expert testified that the Louisiana Department of Transportation’s failure to widen a road to conform to AASHTO standards was negligent,<sup>193</sup> and the court found evidence of negligence sufficient to support a jury verdict.<sup>194</sup> It could be argued that, under *Corso*, decisions relating to road width are not protected under discretionary immunity where those decisions are contrary to AASHTO standards.

This interpretation of *Corso*, however, is incorrect for two reasons. First, the *Corso* court did not mention discretionary immunity, which implies that the government might not have alleged such immunity and the *Corso* court might have ruled otherwise had the state raised the defense. Second, the court’s finding of negligence was not based solely on the state’s failure to widen the road. The plaintiff’s expert emphasized that the state should have placed a warning sign 200 feet, rather than 400 feet, from the curve where the plaintiff was injured.<sup>195</sup> The court specifically relied on this testimony, holding that a “reasonable person could well have determined that the road was improperly designed, or at least that the sign was improperly located.”<sup>196</sup> In other words, the closest the court came to criticizing the state’s road-widening decision was a vague reference to “improper design,” yet the court specifically mentioned the location of the curve warning sign. Because the *Corso* court did not explicitly hold that the state’s decision with regard to street width was negligent, it does not reject the application of discretionary immunity to street-width decisions.

## Comment

It could also be argued that even discretionary decisions are not immune from liability where a government’s decision is clearly unreasonable. For example, liability may be found where government officials were on notice that a street or intersection was dangerous.<sup>197</sup> Pedestrian-friendly streets, though, may actually be safer than those designed for high traffic.<sup>198</sup> Thus, concerns over notice are unlikely to support liability in cases where a plaintiff challenges streets designed for slow traffic.

## *In the Absence of Immunity*

The discussion above is relevant to states applying discretionary immunity to street design, but a few states seem to reject immunity in highway design cases.<sup>199</sup> In these states it could be argued that any breach of AASHTO guidelines is likely to constitute an act of negligence. Nevertheless, precedent from at least one state suggests otherwise.

187. Day, 2002 WL 31525359, at \*2.

188. 682 N.W.2d 70 (Iowa 2004).

189. See footnote 188, at p. 71.

190. See footnote 189.

191. See footnote 190 The court went on to hold that the city’s decision was based solely on cost, and was thus not the sort of policy decision protected by discretionary immunity. *Ibid* at p. 76. But see *Duncan v. Union Pac. R.R.*, 790 P.2d 595, 601 (Utah Ct. App. 1990), *aff’d*, 842 P.2d 832 (Utah 1992) (because highway maintenance and improvement “are predominantly fiscal matters...we will not hold [transportation officials] negligent for having to strike a difficult balance between the need for greater safety and the burden of funding improvements”) (footnote omitted).

192. 927 So. 2d 567 (La. Ct. App. 2006).

193. See footnote 192, at p. 568.

194. See footnote 193, at p. 569. The court went on to dismiss the case on causation grounds, holding that the driver’s negligence was the true cause of the accident. *Ibid* at p. 569–70.

195. See footnote 194, at p. 568.

196. See footnote 195, at p. 569 (Emphasis added).

197. See *Jones v. Miss. Transportation Commission*, 920 So. 2d 516, 519 (Miss. Ct. App. 2006) (discretionary immunity is inapplicable where the government is “given notice of a dangerous condition”).

198. See footnotes 225–233 and accompanying text.

199. See 40 Am. Jur. 2d Highways, Streets and Bridges § 381; 2008 (discussing cases from Kentucky and Illinois); Jonathan T. Mann, *The Narrow Road: Defective Highway Design Claims and the Michigan Highway Exception to Governmental Immunity*, 50 Wayne L. Rev. 999; 2004 (describing the law of one such state, Michigan, in detail).

A Michigan statute provides that “each governmental agency having jurisdiction over a highway shall maintain the highway in reasonable repair so that it is reasonably safe and convenient for public travel.”<sup>200</sup> Under Michigan case law, this statute creates a “highway exception” to governmental tort immunity.<sup>201</sup> But in *Hanson v. Board of County Road Commissioners*,<sup>202</sup> the Michigan Supreme Court made it clear that this statute does not allow unlimited litigation against government agencies. In *Hanson*, the plaintiff’s decedent died in a head-on collision at the crest of a hill, and the plaintiff alleged that the road was unsafe for a variety of reasons, including inadequate street width.<sup>203</sup> The court rejected the plaintiff’s claim on the ground that the statute’s reference to “maintain[ing] the highway in reasonable repair” means that the highway exception is limited to “failure to repair or maintain the actual physical structure of the roadbed surface,”<sup>204</sup> and thus creates no duty to “design, or to correct defects arising from the original design or construction of highways.”<sup>205</sup> Because the statute created no duty to design roads carefully, government officials also had no duty to “improve or enhance existing highways, as by widening existing lanes or banking existing curves; that they augment existing highways, as by adding left-turn lanes.”<sup>206</sup> In Michigan, as in discretionary immunity states, governments are not liable for negligent street design merely because those roads are too narrow to accommodate high-speed traffic.

Similarly, in *Brooks v. Michigan Department of Transportation*,<sup>207</sup> an injured plaintiff alleged that “the narrow width of the shoulder on a sharp curve constituted a failure to maintain or repair the roadway”<sup>208</sup> under the highway exception statute. The Michigan Court of Appeals rejected the plaintiff’s claim, explaining that under *Hanson*, “state and county road commissions have no duty . . . to improve upon or correct defects arising from the original design of a roadway and no duty to redesign a roadway.”<sup>209</sup>

Brooks and *Hanson* suggest that even in the absence of discretionary immunity, statutes that subject road designers to liability for negligence will be narrowly construed. Moreover, in the absence of clear statutory language to the contrary, government agencies need not be liable for designing a road too narrowly to accommodate speeding motorists.

## EVEN IN THE ABSENCE OF IMMUNITY, THE GREEN BOOK ALLOWS PRO-PEDESTRIAN DESIGN

Even if street designers are unable to avail themselves of some type of immunity to protect against liability, it does not follow that the Green Book requires street designers to adopt the high-speed status quo.

First, the Green Book itself provides that it is not intended to set forth mandatory guidelines. As noted above,<sup>210</sup> the foreword to the most recent Green Book states that its guidelines are not intended to “super[s]ede the need for the application of sound principles by the knowledgeable design professional”<sup>211</sup> or to preclude “independent designs tailored to particular situations.”<sup>212</sup>

In *Riley v. United States*,<sup>213</sup> the U.S. Court of Appeals for the Eighth Circuit interpreted this language to allow deviation from Green Book guidelines. In *Riley*, a motorist crashed into another vehicle because mailboxes obscured his view of traffic.<sup>214</sup> The plaintiff sued the United States Postal Service (USPS) for negligent placement of the mailboxes and asserted that USPS failed to follow Green Book recommendations governing intersection design.<sup>215</sup> Even though the Green Book

200. Mich. Comp. Laws Ann. § 691.1402(1) (West 2000).

201. See Mann, footnote 199, at p. 1003.

202. 638 N.W.2d 396 (2002).

203. See footnote 202, at p. 397–8 (describing the underlying facts and the plaintiff’s claims, including her claim that the government failed “to maintain 160th Avenue [the street where the crash occurred] at a proper and adequate width . . . to provide motorists reasonable margins of error in their driving patterns and allow oncoming vehicles to safely pass each other at the crest of the hill”).

204. See footnote 203, at p. 400 (explaining why exception does not allow claims of inadequate street signage).

205. See footnote 204, at p. 401.

206. See footnote 205, at p. 402 (quoting *Wechsler v. Wayne County Rd. Comm’r*, 546 N.W.2d 690, 694 (Mich. Ct. App. 1996)).

207. Nos. 232,521, 232,750, 234,213, 235,509, 2003 WL 1442457, at \*1 (Mich. Ct. App. Mar. 13, 2003).

208. See footnote 207.

209. See footnote 208, at \*2.

210. See AASHTO 2004, footnote 52, at p. xliii and accompanying text.

211. See footnote 210.

212. See footnote 211.

213. 486 F.3d 1030 (8th Cir. 2007).

214. See footnote 213, at p. 1031.

215. See footnote 214, at p. 1033 (quoting the Green Book, which states that drivers “must have sufficient sight distance to make a safe departure through the intersection area”).

was incorporated by reference into relevant federal regulations,<sup>216</sup> the court held that discretionary immunity barred the plaintiff's claim because the "Green Book provisions... are guidelines and not mandatory."<sup>217</sup> Although Riley was decided in the context of discretionary immunity, the court's language nevertheless supports the broader proposition that the Green Book's language-by its own terms-is not binding upon street designers.

Second, recent language used in the Green Book creates additional flexibility for street designers because it incorporates pro-pedestrian language that transportation planners can balance against the Green Book's pro-speed clauses. For example, the 2004 Green Book emphasizes that street designers should consider the interests of non-drivers as well as drivers.<sup>218</sup> A government agency that is sued for not aggressively accommodating high-speed traffic can therefore reduce its risk of liability through its use of the Green Book, as long as the decision at issue is motivated by the public interest in protecting non-drivers.

The Green Book's more specific provisions also insulate pro-pedestrian street designers from liability. The Green Book explicitly states that arterial streets need not be wider than four lanes, and that other streets can be as narrow as two lanes.<sup>219</sup> The Green Book's lane-width standards also accommodate non-drivers' interest in narrower, easy-to-cross streets because they allow eleven-foot lanes on arterials and nine-foot lanes on other streets.<sup>220</sup> Thus, an engineer who designs an eighteen-foot collector street can claim that her compliance with the Green Book is evidence of non-negligence.

In one respect, the Green Book virtually mandates pro-pedestrian policies when it states that sidewalks should be the norm not only in commercial areas but also in residential areas where pedestrian activity is more likely.<sup>221</sup> It could be argued, then, that a road designer that fails to build sidewalks is in violation of the Green Book and risks liability. This argument, though, is unlikely to succeed because numerous cases have held that municipalities have no duty to install sidewalks.<sup>222</sup>

## Comment

In sum, the Green Book's specific recommendations are not binding on transportation planners, and even if they were, they often support the construction of pedestrian-friendly streets. It is significant that the Green Book no longer consistently supports the high-speed status quo.

## THE POLICY ISSUE: WHY BOTHER?

As explained above, American tort law allows transportation planners to build narrower, more pedestrian-friendly streets. It could be argued, however, that such reforms are unwise as a matter of policy because the overwhelming majority of Americans drive to most destinations,<sup>223</sup> and as such, drivers' interest in fast traffic flow is more important than the safety and comfort of pedestrians and bicyclists. But in fact, even drivers may be safer on pedestrian-friendly streets than on high-speed, auto-oriented streets. Drivers are less likely to notice other drivers when traveling at high speeds and therefore more likely to injure those drivers.<sup>224</sup> Accordingly, drivers may actually be safer when traveling on streets designed for pedestrians as well as cars.

One recent study examined 5 years of crash data (1999–2003) for Colonial Drive in Orlando, Florida. The study compared two 0.9-mile-long stretches of the street: a relatively pedestrian-friendly area with four eleven-foot travel lanes with

216. See footnote 215 (citing 23 C.F.R. § 625.4 (2008)).

217. See footnote 216 (citations omitted).

218. See footnotes 77–94 and accompanying text.

219. See footnotes 87–91 and accompanying text.

220. See AASHTO 2004, footnote 52, at p. 311, ("Lane widths of 2.7–3.6 m [9–12 ft] are generally used..."); *ibid* at p. 472 (noting that "Lane widths of 3.3 m [11 ft] are used quite extensively for urban arterial street designs" and suggesting that even ten-foot lanes may be appropriate on arterials in "areas having little or no truck traffic.");

221. See footnote 220, at p. 357 (in "suburban residential areas ... if pedestrian activity is anticipated, sidewalks should be included"); *ibid* at p. 358 ("sidewalks should be constructed along any street or highway not provided with shoulders"); *ibid* at p. 436 ("Sidewalks should be provided... along all collectors in commercial areas.") (emphasis added).

222. See, e.g., *Bd. of Educ. of Dolton Sch. Dist. 149 v. Miller*, 812 N.E.2d 688, 694 (Ill. App. Ct. 2004) ("[I]n the context of tort law, this court has held that public entities do not have a duty to construct sidewalks."); *Radzka v. Inc. Vill. of Kings Point*, 686 N.Y.S.2d 805, 807 (N.Y. App. Div. 1999) (village "had no duty to install sidewalks"); *Braithwaite v. W. Valley City Corp.*, 921 P.2d 997, 998 (Utah 1996) ("the City has no legal duty to construct sidewalks"). However, these decisions contain no indication that the deciding courts were made aware of AASHTO's endorsement of sidewalks.

223. Ronda Larson, *The End of an Era: Suburban Village Aversion in Citizens for Mount Vernon v. City of Mount Vernon*, 74 Wash. L. Rev. 367, 376 n.53; 1999 (stating that "[e]ighty-six percent of trips taken by Americans are by car").

224. See footnotes 52–56 and accompanying text; See footnote 49, at p. 704; See footnote 145.

on-street parking, and a nearby area with fifty-foot-wide streets<sup>225</sup> without on-street parking.<sup>226</sup> Even though the two areas had equal traffic volume and were of equal length,<sup>227</sup> the wider section of Colonial Drive had six fatal crashes—three of which involved pedestrians—while the narrower section had none.<sup>228</sup> Moreover, the more walkable section of Colonial Drive also had 31% fewer injuries from mid-block crashes and 11% fewer total mid-block crashes.<sup>229</sup> The study also compared the relatively walkable section of Colonial Drive with a conventionally designed ten-mile section of that street; the walkable section had 35% fewer injurious mid-block crashes per mile and 25% fewer total mid-block crashes.<sup>230</sup>

A study involving residential streets reached similar conclusions. The study analyzed 20,000 accident reports from the city of Longmont, Colorado, approximately thirty-five miles north of Denver,<sup>231</sup> and discovered that thirty-six-foot-wide residential streets had more than five times as many accidents per mile per year than twenty-four-foot-wide streets.<sup>232</sup> These data make clear that pedestrian-friendly streets designed for low speeds are safe for drivers as well as pedestrians.<sup>233</sup>

Furthermore, “drivers” and “pedestrians” are not mutually exclusive categories. Most drivers walk outside at some point during their lives and, to the extent that walking is safe and comfortable, these driver/pedestrians experience the benefits of such safety and comfort. To the extent that pedestrian-friendly streets encourage people to walk to some places to which they would otherwise drive a car, congestion on America’s streets as well as air pollution is reduced.<sup>234</sup>

## CLOSURE TO THIS REVIEW

American transportation planners have frequently designed streets in order to accommodate automobiles operating at high speeds. Often, these streets are not safe or convenient for pedestrians and other non-drivers. Ironically, one reason road designers continue to build high-speed streets is their concern about tort liability, in particular: their fear that if they deviate from the Green Book guidelines in building more pedestrian-friendly streets, they may face extensive litigation if a driver is injured on a street at speed that failed to accommodate that level of speed.

This concern is no longer persuasive for two reasons. First, discretionary immunity protects government officials from negligence liability for decisions to build narrower, low-speed streets provided those decisions are based on policy judgments, and a decision to make a street safer for pedestrians is such a policy judgment. Second, recent versions of street-design manuals grant transportation designers considerable flexibility to build calmer, more pedestrian-friendly streets. An engineer who acts in accordance with street-design manuals may therefore build streets that accommodate non-drivers as well as drivers without risking liability merely for making decisions that accommodate non-drivers.

225. See Eric Dumbaugh, *Safe Streets, Livable Streets*, 71 J. Am. Plan. Ass’n 283, 288–90; 2005 (describing study and describing portions of Colonial Drive studied).

226. See footnote 225, at p. 290 (comparing street widths of two portions of Colonial Drive and noting, in particular, that the pedestrian-oriented section of the street had parking lanes, while the more conventional section had paved shoulders).

227. See footnote 226 (both sections of the street were 0.9 miles long; both had between 46,000 and 47,000 vehicles per day passing through them).

228. See footnote 227, at p. 288.

229. See footnote 228, at p. 290. The study focused on mid-block crashes, perhaps because crashes at intersections may be the result of the design of the intersecting street rather than the result of the design of Colonial Drive alone. I note, however, that the number of crashes at intersections for both portions of Colonial Drive were roughly comparable. *Id.* (twenty-one crashes per intersection in pedestrian-friendly part of Colonial Drive, as opposed to nineteen crashes per intersection in conventionally designed portion of street).

230. See footnote 229, at p. 291.

231. See Swift P, Painter D, Goldstein M, *Residential street typology and injury accident frequency*; 1997. Available at: <http://massengale.typepad.com/venustas/files/SwiftSafetyStudy.pdf>.

232. See footnote 231, at tbl. 2.

233. It could be argued that the low crash rates of high-speed interstate highways suggest otherwise. Interstate highways have no pedestrians; thus, design features that would make a normal street dangerous are not as harmful on interstates. See footnote 225, at p. 295 (noting that interstates “limit their use to a single user type—motorists”). Moreover, many interstates have no intersections, and thus have fewer points where vehicles traveling in different directions could collide. See Mitch Tobin, *Interstates Relatively Safe, Experts Say*, *Ariz. Daily Star*; Mar. 12, 2006. Available at: <http://www.azstarnet.com/sn/byauthor/119685>.

234. See Oliver Gillham, *The Limitless City: A Primer on the Urban Sprawl Debate* 95, 113–14; 2002 (discussing growth of traffic congestion and hazards of car-induced air pollution; noting that reduction in car trips might reduce congestion and pollution). It could be argued, of course, that most people will drive rather than walk no matter how streets are designed. But this argument is rebutted by the fact that even within the narrow universe of large American cities, some cities have far more pedestrians than others. See Men’s Fitness, 2009 Fittest Cities: #1 Salt Lake City, UT. <http://www.mensfitness.com/lifestyle/193?page=2> (residents of Salt Lake City “walk for fitness 109% more than residents of the average city in our survey”); Men’s Fitness, 2009 Fattest Cities in America: 25 Towns in Need of a Fitness Overhaul. <http://www.mensfitness.com/lifestyle/216> (by contrast, residents of Oklahoma City “are 28% less likely to participate in fitness walking than average”).