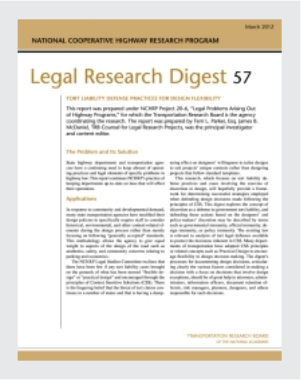

Tort Liability Defense Practices for Design Flexibility

DETAILS

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TORT LIABILITY DEFENSE PRACTICES FOR DESIGN FLEXIBILITY

This report was prepared under NCHRP Project 20-6, "Legal Problems Arising Out of Highway Programs," for which the Transportation Research Board is the agency coordinating the research. The report was prepared by Terri L. Parker, Esq. James B. McDaniel, TRB Counsel for Legal Research Projects, was the principal investigator and content editor.

The Problem and Its Solution

State highway departments and transportation agencies have a continuing need to keep abreast of operating practices and legal elements of specific problems in highway law. This report continues NCHRP's practice of keeping departments up-to-date on laws that will affect their operations.

Applications

In response to community and developmental demand, many state transportation agencies have modified their design policies to specifically require staff to consider historical, environmental, and other context-related elements during the design process rather than merely focusing on following "generally accepted" standards. This methodology allows the agency to give equal weight to aspects of the design of the road such as aesthetics, safety, and community concerns relating to parking and economics.

The NCHRP Legal Studies Committee realizes that there have been few if any tort liability cases brought on the grounds of what has been termed "flexible design" or "practical design" and encouraged through the principles of Context Sensitive Solutions (CSS). There is the lingering belief that the threat of tort claims continues in a number of states and that is having a dampening effect on designers' willingness to tailor designs to suit projects' unique contexts rather than designing projects that follow standard templates.

This research, which focuses on tort liability defense practices and cases involving the exercise of discretion in design, will hopefully provide a framework for determining successful strategies employed when defending design decisions made following the principles of CSS. This digest explores the concept of discretion as a defense to government tort liability, and defending these actions based on the designers' and policy-makers' discretion may be described by terms such as governmental immunity, official immunity, design immunity, or policy immunity. The existing law is relevant to analysis of tort legal defenses available to protect the decisions inherent in CSS. Many departments of transportation have adopted CSS principles or related concepts such as Practical Design to encourage flexibility in design decision-making. The digest's processes for documenting design decisions, articulating clearly the various factors considered in making a decision with a focus on decisions that involve design exceptions, should be of great help to attorneys, administrators, information officers, document retention officials, risk managers, planners, designers, and others responsible for such decisions.

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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TORT LIABILITY DEFENSE PRACTICES FOR DESIGN FLEXIBILITY

By Terri L. Parker, Esq., Nixa, Missouri

I. INTRODUCTION

Challenging times have required state transportation agencies to rethink traditional design methods. To maximize taxpayer funds and be more responsive to the concerns of the public, many transportation agencies have modified their design policies to specifically require staff to consider historical, environmental, and other context-related elements during the design process rather than merely focusing on following "generally accepted" standards. This methodology allows the agency to give equal weight to aspects of the design of the road such as aesthetics, safety, and community concerns of availability of parking and economics. These approaches are commonly called context sensitive design (CSD), context sensitive solutions (CSS), or flexible design. CSS and CSD are collaborative, interdisciplinary approaches that involve all stakeholders in providing a transportation facility that fits its setting. CSS and CSD methods lead to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources while improving or maintaining safety, mobility, and infrastructure conditions.[1]

Until recently, the threat of tort claims and insurance practices discouraged engineers from trying innovative designs and effectively limited them to using "cookbook" guidelines and standards. The problem was noted in *Flexibility in Highway Design,*[2] where it is stated:

> As a result of concerns about litigation, designers may be tempted to be very conservative in their approaches to highway design and avoid innovative and creative approaches to design problems. While it is important for design engineers to do their jobs as thoroughly and carefully as possible, avoiding unique solutions is not the answer. This may undermine design practice and limit growth in the engineering profession. Designers need to remember that their skills, experience, and judgment are still valuable tools that should be applied to solving design problems and that, with reliance on complete and sound documentation, tort liability concerns need not be an impediment to achieving good road design.[3]

When defending design defect cases, departments of transportation (DOT) typically need to prove that the original design complied with the generally-accepted standards that were in place at the time the road was designed and constructed.

> The AASHTO Green Book, other state-adopted highway standards, Federal and State regulations and guidelines, and research publications issued by the Transportation Research Board are often used in tort cases to educate the jury about the standard level of practice for design. In addition, experts are used, who in turn rely on written text to explain the accepted standard practices for design to the jury. This does not mean, however, that adherence to accepted standard practices, such as the AASHTO Green Book guidelines, automatically establishes that reasonable care was exercised. Conversely, deviation from the guidelines, through the use of a design exception, does not automatically establish negligence. The best defense for a design engineer is to present persuasive evidence that the guidelines were not applicable to the circumstances of the project or that the guidelines could not be reasonably met.[4]

This digest is intended to assist counsel in advising transportation agencies how to document the flexible design process and defend design defect cases where generally-accepted standards of road design were not strictly followed, but nevertheless the road was reasonably safe.

The National Cooperative Highway Research Program (NCHRP) has published the following works, which have been reviewed in preparation for this project: John M. Mason, Jr., and Kevin M. Mahoney, *Design Exception Practices, A Synthesis of Highway Practice*, NCHRP Synthesis 316, 2003; and Richard O. Jones and James B. McDaniel, *Risk Management for Transportation Programs Employing Written Guidelines as Design and Performance Standards*, NCHRP 20-6, 1997. Other pertinent publications have been consulted: Richard O. Jones, Context Sensitive Design: Will the Vision Overcome Liability Concerns?, *Transportation Research Record 1890*: *Journal of the Transportation Research Board*, 2004; and William J. Stein and Timothy R. Neuman, *Mitigation Strategies for Design Exceptions*, Federal Highway Administration (FHWA), 2007. This digest is not an update of the earlier works, but those works did provide some of the basic framework for the content herein and will be quoted and referred to throughout the digest.

II. USE OF CONTEXT SENSITIVE DESIGN METHODS

To provide data for this digest, two different surveys were sent to each of the 50 states. One survey was to be answered by the design department and the other survey by the legal department. The surveys and a compilation of the results are attached as Appendix A, B, and C. Responses were received from 28 states. Following is an analysis and summary of the survey results.

[1] Available at http://www.contextsensitivesolutions.org/content/topics/what_is_css/.

[2] Available at http://www.fhwa.dot.gov/environment/flex/index.htm.

[3] Available at http://www.fhwa.dot.gov/environment/flex/ch02.htm.

[4] *Id*.

A. Current Balancing Factors or Context Sensitive Design Policies

Numerous examples of flexible design were identified. More than half of the states have adopted policy statements directing designers to make decisions based on factors such as safety, environmental, historical, and economic concerns rather than focusing only on compliance with rigid standards. The following policies were found in the survey responses and via Internet research.

• *California Director's Policy*: The Department uses CSS as an approach to plan, design, construct, maintain, and operate its transportation system. These solutions use innovative and inclusive approaches that integrate and balance community, aesthetic, historic, and environmental values with transportation safety, maintenance, and performance goals.[5] The context of all projects and activities is a key factor in reaching decisions. Context must be considered for all State transportation and support facilities when staff is defining, developing, and evaluating options. When considering the context, issues such as funding feasibility, maintenance feasibility, traffic demand, impact on alternate routes, impact on safety, and relevant laws, rules, and regulations must be addressed.

• *Georgia Quality Control/Quality Assurance (QC/QA) Program*:

> The…Quality Control and Quality Assurance program has been developed by the Engineering Division of the Georgia Department of Transportation to ensure the engineering, design, plans and quantities developed by our design offices are supported by comprehensive studies and sound engineering judgment, comply with established polices, guidelines and standards, and contain appropriate design flexibility and cost saving measures.6

• *Maryland* has two policies that accomplish context sensitive goals: The publication "When Main Street is a State Highway" documents its CSD approach, and its Complete Streets Policy ensures that all users of the transportation network are taken into account in design practices.[7]

• *Oregon*: "Practical Design" is a strategy adopted to reduce cost and still deliver tangible benefits to the traveling public from improvements made. At a minimum, it considers safety, economic development, communities if a project passes through them, the environment, the overall transportation system (not just highways), and cost.

In Oregon, Practical Design is a systematic approach to deliver the broadest benefits to the transportation system within existing resources by establishing appropriate projects scopes and design guidelines to deliver specific results. Two unique features of Practical Design are that it provides flexible parameters so that design teams can be confident that a particular solution is "good enough" and sufficient to improve the transportation system, without being excessive. It allows engineers to take the concept across a system level, down to a corridor level, and then apply it to each project. It is a way to let "engineers engineer"…not just apply criteria by the book. It is important to understand that Practical Design does not throw out engineering guidance or standards. Rather, flexibility in design typically requires more information and a higher level of analysis when defining and deciding on the most appropriate design value for a particular location. It requires maintaining focus on the project's purpose and need and a clear process for approving and documenting the rationale for important design decisions. It requires good use of engineering judgment to assess the severity of adverse consequences, evaluate design tradeoffs, and mitigate risks to the extent it is practical.[8] Missouri, Kentucky, and Kansas have similar programs.

Pennsylvania and New Jersey have adopted a program called "Smart Transportation."[9] The following concepts are explained in their *Smart Transportation Guidebook*.

• *Tailor solutions to the context*—The design of a road should reflect the surrounding environment and the role it serves in the community by using transitions through rural, suburban, and urban communities and reflect the unique conditions along the way.

• *Tailor the approach*—The approach to identifying transportation needs and potential solutions should be developed in partnership with the community, project team members, and other interested parties early in the process.

• *Plan all projects in collaboration with the community*—It is necessary for the New Jersey Department of Transportation (NJDOT) and the community to work together to ensure that appropriate land use controls are put in place and the roadway design supports community goals.

• *Plan for alternative transportation modes*—Similar to the Complete Streets concept, Smart Transportation encourages roads to be designed with all users in mind, balancing vehicular and nonvehicular needs.

• *Use sound professional judgment*—The use of a flexible design approach is essential to providing a context sensitive roadway that meets the unique circumstances of a given community. This approach requires the designers to think outside of the box and use their professional judgment to develop a creative solution.

[5] http://www.dot.ca.gov/hq/oppd/context-solution.pdf.

[6] http://www.dot.state.ga.us/doingbusiness/PoliciesManuals/roads/OtherResources/GDOT_QCQA_Program.pdf.

[7] http://www.roads.maryland.gov/ohd/MainStreet.pdf, Maryland Complete Streets Policy, 2011.

[8] Email from Oregon Transportation Deputy Director Douglas J. Tindall regarding implementation of Practical Design (Nov. 17, 2009). (Available at office of author upon request.)

[9] http://www.nj.gov/transportation/works/njfit/guidebook.shtm.

• *Scale the solution to the size of the problem*—Considering possible transportation solutions should first include lower-cost, lower-scale approaches such as transportation system management and other noncapacity adding solutions before seeking a widening alternative.

Summary of Survey Results

Of the responding states, 19 (67 percent) said that the agency had a written policy that required staff to consider and balance cost, environmental, scenic, or historical significance when scoping and designing the project.

• The responder from Illinois stated that "…designers must seek, to use all of the flexibility inherent in the policies to craft the best possible solutions to identified transportation problems."

• Oregon responded to the survey by stating that "[a]t the core of our Practical Design program is the concept of delivering focused benefits for the transportation system while working within the realities of a fiscally-constrained funding environment—balance is key."

• Similarly, Maryland stated that it has adopted a CSD approach on many state highway projects. In addition to CSD, the transportation department is now in the process of adopting a "complete streets" policy which ensures that all users of the transportation network are taken into account during the design phase.

• Massachusetts adopted a guide that requires staff to "consider and balance cost, environmental, scenic and historical significance." The purpose of its guide is to "provide designers and decision makers with a framework for incorporating context sensitive design and multimodal elements into transportation improvement projects."

While many states do not currently have a formal written policy requiring staff to consider balancing of historical, environmental, safety, and cost factors, most of their survey responses indicated that those factors are considered during the design phase.

Analysis of the Policies

The text of all the flexible design policies cannot be included in this publication due to their length. However, it appears that the policies fall into five categories:

1. Policies that reflect legislative approval of the CSD process.
2. Policies that explicitly state that safety is only one goal of CSD and that it must be balanced with all the other goals.
3. Policies that reference balancing all factors, including safety.
4. Policies that recommend some type of CSS but do not discuss the balancing factors contained within the theories.
5. Policies that recommend using CSS/CSD strategies but emphasize safety as the paramount factor.

Counsel should review their state's design policy to ensure that the text of the policy and the practice of the department assist counsel and the agency when litigation occurs. There are several different types of policies, as noted above. For instance, the California Director's Policy states that "[c]ontext must be considered for all State transportation and support facilities when staff is defining, developing, and evaluating options. When considering the context, issues such as funding feasibility, maintenance feasibility, traffic demand, impact on alternate routes, impact on safety, and relevant laws, rules, and regulations must be addressed." If and when the state is sued on a design defect claim, it would be very helpful to the defense if there is documentation in the file of how each of the factors identified in the Director's policy was actually considered, addressed, or debated.

In Hawaii, the legislature has authorized and directed the agency to consider safety, environmental, and historical aspects of the highway design, and all modes of transportation during the design phase of new construction and reconstruction. The law[10] specifically exempts the people who made those decisions and the agency those people work for from liability should litigation occur as the result of a perceived flaw in the design procedure. This law practically guarantees that very little litigation relating to new design will occur. Vermont has a similar law.

It is sometimes difficult to reconcile a department's public statements with the need for a sound legal defense in the event of personal injury claims. If possible, it may be helpful to the defense of a design case and ultimately the agency to consider a policy that specifically states that while safety is an important factor that will always be considered in the design of the project, it will be balanced with other equally important factors such as economic, historical, and environmental considerations. This language corresponds to the policy type noted above as Category 2, policies that explicitly state that safety is only one goal of CSD and that it must be balanced with all the other goals, or Category 3, policies that reference balancing of all factors, including safety. If the agency considers each of the factors to be equally important, and that fact is noted in the policy, the courts should give deference to the policy when determining whether the agency acted reasonably in the design of the road.

Counsel may be able to use the flexible design policy as the basis of a discretionary immunity defense. As will be discussed later, it is likely that the adoption of an overall design policy would be considered a discretionary action by the governing body. Evidence that the governing authority adopted the policy after careful review of the competing public policy considerations lends credence to this proposal and could be the basis of a successful discretionary defense.

[10] HAW. REV. STAT. § 264-20.

For a complete listing of the states that responded to the survey and their responses, see attached Appendices B and C.

B. Application of Context Sensitive Design

Responding states provided examples of CSD success stories in their survey responses. Generally speaking, environmental, safety, historical, and cost aspects and impacts of the project are considered in the planning phase of the project. The public is involved in the process, which ensures more buy-in for the project because their input is considered. For the purposes of this digest, because many agencies must defend against personal injury claims on the premise that a road is reasonably safe, focus herein is on the steps taken by designers to ensure flexible designs did not compromise the safety of the system. It should be noted, however, that there are many examples of flexible design that do not focus on safety; they focus on maintaining the character of the road, preserving important historical landmarks, or reducing environmental impacts.

• Delaware—One state road corridor was in need of improvement for more than 30 years. The community did not want the four-lane roadway that the Delaware Department of Transportation (DelDOT) had proposed because they wanted to retain their "small town" atmosphere. The DelDOT Needs Analysis identified four basic needs—reduction of congestion, safety improvement, establishment of defined entrances, and improvement of existing roadway conditions. Since the community was unwilling to accept a widening of the road, the state studied the amount and type of accidents in the corridor and determined that the accident and safety problem could be addressed by providing center turn lanes and right-turn lanes at intersections. To address the problem of vehicles leaving the road and striking fixed objects, such objects were moved outside the clear zone. The addition of safety grading and traversable slopes provided the recommended recovery area for errant vehicles. Design exceptions were obtained for a reduced-width center turn lane, and the above-noted mitigation steps were taken to accomplish the goals of minimizing impacts to residences and businesses, controlling cost, and improving overall safety.

• Colorado—Glenwood Canyon on I-70 was built in an environmentally-sensitive area. Compound curves were used where other alignments could not accommodate the environmental features of the canyon and an existing power plant. The widths of the highway lanes were originally 4 ft, 12 ft, and 12 ft, with 6-ft outside shoulders. When the highway was repaved recently, it was restriped as 4 ft, 11 ft, and 11 ft, with 8-ft shoulders because the 6-ft shoulders were causing problems for broken-down vehicles that had no safe refuge. Having 11-ft lanes is not standard on Interstate highways but it was considered to be a safety improvement to have 11-ft lanes and an 8-ft breakdown shoulder. Survey results indicated that Colorado DOT did not have documentation or analysis of the initial decision to restripe the road. However, staff believed that a safety study of the road done in the future would prove that the changes were beneficial to the overall safety of the road.

• Florida—Cost considerations and safety were highlighted when the designer used the analysis found in the recently published *Highway Safety Manual.*[11] Using that analysis, the designers were able to demonstrate that a divided highway with a median was much safer than a four-lane road with a two-way, left-turn lane. The analysis demonstrated an improvement in the safety of the corridor and saved the cost of the purchase of additional right-of-way.

• Maryland—When considering the I-695 bridge replacement, the department decided to reduce the advisory speed on one of the ramps because the ramp that was called for in the plans did not meet the American Association of State Highway and Transportation Officials (AASHTO) radius requirement. Safety improvements that were used to mitigate the reduction included adding signing and lighting along the ramps, adding a traffic barrier, removing existing vegetation to improve sight distance, and making geometric improvements. While the bridge ramp does not meet the AASHTO standard, staff is confident that the ramp is reasonably safe. Staff who responded to the survey indicated that the design exception file and milestone reports are kept indefinitely and that those documents adequately document the mitigation strategies and decision process used. Those documents show the agency's deliberative process and explain the reasons that the generally-accepted standards could not reasonably be achieved.

• Washington—The I-90 Snoqualmie Pass East corridor is located in Kittitas County within the Wenatchee National Forest. The highway was upgraded from two to three lanes in each direction. Problems included road closure due to avalanches, which were addressed by construction of snow retention fences and a snow shed to protect the roadway from avalanche chutes, accidents involving wildlife, and the existence of six curves that did not meet minimum design standards for the posted speed. Wildlife crossings were expanded and portions of the alignment were straightened. To accommodate environmental concerns and the mountainous terrain, reduced median and shoulder widths were used. To mitigate the narrower lanes and median widths, high-performance barriers and rumble strips were used.

C. Documentation Use in Litigation

The states were asked whether documentation that they had gathered during the design process was useful in later defending the state in court or against legal challenges. Fifteen of the 28 states (53 percent) responded that they had used documentation of the deci-

[11] Survey Response, Florida, Mar. 2011. See Florida Highway Safety Manual, available at http://www.flhsmv.gov/fhp/Manuals/.

sion-making for such purpose, and 12 of the 15 states (80 percent) reported that the defense had been successful or partially successful. Summaries of their responses are provided below.

- Alabama's response was typical. Their counsel stated that "virtually any document produced during the design process has and can be used in defending litigation. We may offer documents to show our action and reasons for our action. We may use that same documentation to refute evidence contrary to the Department's position." [12]
- In Washington State, design documentation has been used in two ways. Some of the documentation is used to show that decisions occurred at the highest level and were policy-making in nature. The choice of the appropriate design guidelines (standards) for a highway is made by the Washington State Transportation Commission. Some choices are made in accordance with the state's Strategic Highway Safety Plan and therefore subject to discretionary immunity. Project files are often used to create the documentation that shows appropriate decisions were made by the engineer. This documentation includes project summaries, design deviations, corridor analyses, and studies.[13]
- The Pennsylvania Department of Transportation reported success in defending its tort claims and often uses documentation gathered during the design process to defend itself. The Pennsylvania Rules of Evidence permit an expert witness to present all relevant engineering standards, principles, criteria, warrants, and any other facts and data used by engineers to show the jury that the selected design was in accordance with generally-accepted engineering principles.[14]
- Tennessee indicated that original plans were often used to investigate design criteria for claims filed against the state. "Engineers for the state compare the design criteria used with the AASHO/AASHTO design standards that were current at the time the project was designed."[15]

D. RECOMMENDATIONS

As the literature and the survey responses indicate, one of the state's best strategies for defense of personal injury claims in CSS and CSD cases is solid documentation of the reason for the decision. To do so, standards forms can be developed by the agencies or they can modify the examples in the back of this digest for their use. The documentation should be in conformance with the policy on flexible design. For example, if the state identifies safety as its number one priority, the information in the file should support the proposition that safety—not cost, environmental, or historical concerns—was the focus during the scoping, planning, and design phases. If the policy says that all the factors will be weighed equally, that should be apparent in the documentation.

[12] Survey Response, Alabama, May 2011.

[13] Survey Response, Washington, Apr. 2011.

[14] Survey Response, Pennsylvania, Apr. 2011.

[15] Survey Response, Tennessee, Apr. 2011.

III. STRATEGIES FOR THE DEFENSE OF THE LAWSUIT

This section includes a compilation and analysis of legal cases involving successful and unsuccessful tort liability defenses where agencies have been required to defend discretionary decisions that were intended to achieve multiple public policies. It also includes a framework that may be used to defend cases that contain allegations of design defects as well as a trial preparation outline.

A. LEGAL BASIS FOR DEFENSE

New lawsuits alleging design defects and noncompliance with established standards will likely be based on the premise that had the road been built to AASHTO's *A Policy on Geometric Design of Highways and Streets* (Green Book) or *Roadside Design Guide*[16] or to specific state standards, it would be safe, and that a road or feature of the road that includes a deviation from the generally-accepted guidelines or standards is not safe. That presumption can be overcome with documentation from the original design file that shows the thorough analysis the engineer went through to determine the best design. The contents of that file will likely become the basis of the state's defense.

The most solid legal defenses will be based on immunity such as statutory design, statutory discretion, or compliance with internal or external policy.[17] The attorney must first review applicable law to determine which defenses can be used as the basis for a summary judgment motion or motion to dismiss. Summary judgment may be entered only in those cases where the record clearly demonstrates that there are no genuine issues of material fact and that the moving party is entitled to judgment as a matter of law.[18] Legal defenses are explored thoroughly below.

Missouri Rule of Civil Procedure 74.04[19] is a typical summary judgment motion provision. Essentially the

[16] Available for purchase through AASHTO publication catalog Web site, http://downloads.transportation.org/aashto_catalog.pdf.

[17] For a thorough discussion of immunity see LARRY THOMAS, TORT LIABILITY OF HIGHWAY AGENCIES (National Cooperative Highway Research Program, Selected Studies in Transportation Law, Vol. 4, § 1, 2003).

[18] P.J.S. v. Pa. State Ethics Comm'n, 555 Pa. 149, 723 A.2d 174 (1999).

[19] Motion for Summary Judgment.

> *(a) For Claimant***.** At any time after the expiration of thirty days from the commencement of the action or after service of a motion for summary judgment by the adverse party, a party seeking to recover upon a claim, counterclaim, or cross-claim or to obtain a declaratory judgment may move with or without supporting affidavits for a summary judgment upon all or any part of the pending issues.

moving party files a motion that avers that there are no issues of fact in dispute and asks the court to make a ruling based on the facts that have been established in the case and the law of the jurisdiction.

1. Statutory Design Defense

The agency may be able to base its defense on a state law that allows it to present evidence that the highway complied with state-of-the art or other applicable standards at the time of construction. Compliance may be shown by affidavit or deposition testimony of a professional engineer who has reviewed both the plans and the standards.

*California***.** California is one of the states that has an affirmative design defense. Under California Government Code § 830.6, [20] a public entity is not liable for a dangerous condition of its property if the public entity demonstrates that the injury was caused by property constructed in accordance with an approved plan or design. For design immunity to apply, there must exist 1) a causal relationship between the plan and the accident; 2) discretionary approval of the plan prior to construction; and 3) substantial evidence supporting the reasonableness of the plan.[21] According to the court in *Cornette v. Department of Transportation*, the purpose of the statute is to prevent a jury from second-guessing the decision of a public entity by reviewing the identical questions that have already been considered by the agency.[22]

A motion for summary judgment based on the affirmative defense was successful in *Laabs v. City of Victorville.*[23] The *Laabs* court examined the third element of the law, the definition of "substantial evidence." The court determined that it alone should make the decision whether "there is any substantial evidence upon the basis of which (a) a reasonable public employee could have adopted the plan…or (b) a reasonable employee could have approved the plan or design or standards…." The court found that factors such as whether the evidence would "reasonably inspire confidence" and is of "solid value" should be considered. Typically, substantial evidence "consists of an expert opinion as to the reasonableness of the design or evidence of relevant design standards."

A successful summary judgment motion in California—substantial evidence of the reasonableness of the plan. The *Laabs* court accepted an affidavit of a registered civil engineer who opined that the design was not only reasonable but "excellent," but rejected an affidavit as insufficient where the engineer stated that "the plans and design for the southbound lanes fell within the range of reasonable engineering guidelines."[24] The

*(b) For Defending Party***.** At any time, a party against whom a claim, counterclaim, or cross-claim is asserted or a declaratory judgment is sought may move with or without supporting affidavits for a summary judgment as to all or any part of the pending issues.

(c) Motions and Proceedings Thereon.

(1) *Motions for Summary Judgment.* A motion for summary judgment shall summarily state the legal basis for the motion. A statement of uncontroverted material facts shall be attached to the motion. The statement shall state with particularity in separately numbered paragraphs each material fact as to which movant claims there is no genuine issue, with specific references to the pleadings, discovery, exhibits or affidavits that demonstrate the lack of a genuine issue as to such facts…[A]ttached to the statement shall be a copy of all discovery, exhibits or affidavits on which the motion relies. Movant shall file a separate legal memorandum explaining why summary judgment should be granted.

(2) *Responses to Motions for Summary Judgment.* Within 30 days after a motion for summary judgment is served, the adverse party shall serve a response on all parties. The response shall set forth each statement of fact in its original paragraph number and immediately thereunder admit or deny each of movant's factual statements. A denial may not rest upon the mere allegations or denials of the party's pleading. Rather, the response shall support each denial with specific references to the discovery, exhibits or affidavits that demonstrate specific facts showing that there is a genuine issue for trial. Attached to the response shall be a copy of all discovery, exhibits or affidavits on which the response relies. A response that does not comply with this Rule 74.04(c)(2) with respect to any numbered paragraph in movant's statement is an admission of the truth of that numbered paragraph. The response may also set forth additional material facts that remain in dispute, which shall be presented in consecutively numbered paragraphs and supported in the manner prescribed by Rule 74.04(c)(1).

[20] California Government Code § 830.6 states as follows:

Neither a public entity nor a public employee is liable under this chapter for an injury caused by the plan or *design of a construction of, or an improvement to, public property where such plan or* design has been approved in advance of the construction or improvement by the legislative body of the public entity or by some other body or employee exercising discretionary authority to give such approval or where such plan or design is prepared in conformity with standards previously so approved, if the trial or appellate court determines that there is any substantial evidence upon the basis of which (a) a reasonable public employee could have adopted the plan or design or the standards therefor or (b) a reasonable legislative body or other body or employee could have approved the plan or design or the standards therefor…Notwithstanding notice that constructed or improved public property may no longer be in conformity with a plan or design or a standard which reasonably could be approved by the legislative body or other body or employee, the immunity provided by this section shall continue for a reasonable period of time sufficient to permit the public entity to obtain funds for and carry out remedial work necessary to allow such public property to be in conformity with a plan or design approved by the legislative body of the public entity or other body or employee, or with a plan or design in conformity with a standard previously approved by such legislative body or other body or employee. In the event that the public entity is unable to remedy such public property because of practical impossibility or lack of sufficient funds, the immunity provided by this section shall remain so long as such public entity shall reasonably attempt to provide adequate warnings of the existence of the condition not conforming to the approved plan or design or to the approved standard. However, where a person fails to heed such warning or occupies public property despite such warning, such failure or occupation shall not in itself constitute an assumption of the risk of the danger indicated by the warning.

[21] Cornette v. Dep't of Transp., 26 Cal. 4th 63, 109 Cal. Rptr. 2d 1, 26 P.3d 332 (Cal. 2001).

[22] *Id*. at 69.

[23] 163 Cal. App. 4th 1242, Cal. Rptr. 3d 372 (2008).

[24] *Id*. at 1265.

court pointed out that acceptable language would be that "the design of the overall intersection and approaching northbound lanes was designed to comply with reasonable engineering principles." Note that the court required "reasonable engineering principles"[25] to have been used rather than requiring compliance with a particular guideline or standard such as the AASHTO Green Book.

Iowa. The State has immunity from a claim of negligent design and construction if the road was constructed or reconstructed in accordance with a generally-recognized engineering or safety standard that was in effect at the time of the construction. In *K & W Electric v. State,* [26] a commercial property owner sued the State after his property flooded during a large storm. To demonstrate the applicability of the design immunity, the State submitted the affidavit of David Claman, a civil engineer employed by the DOT. Mr. Claman stated in his affidavit that the hydraulic analysis and design of the highway projects in question were based upon data from a 1984 Federal Emergency Management Agency study. He also stated:

> [b]ased on this analysis, the bridges and structures crossing the main channel of the Cedar River, and the Cedar River diversion channel were sized to span the floodway, defined as the area that must be kept free of encroachments so that a 100-year flood could be carried without a substantial increase, defined as one foot, in flood heights…the project was constructed according to design, in accordance with these recognized, generally accepted engineering criteria existing at the time of the design and construction.[27]

The court found that the highway "was constructed or reconstructed in accordance with a generally recognized engineering…standard, criteri[on], or design theory *in existence at the time of the construction or reconstruction,*" and the motion for summary judgment was sustained.

*Lessons learned***.** Once flexible design becomes more commonplace, it is likely to become more difficult for the agency to prevail at the motion stage since strict compliance with standards will be the exception rather than the rule. However, language such as the agency was in compliance with "reasonable engineering principles" could be used in the engineer's affidavit, rather than language which states that "generally-accepted standards" were followed in the design of the road.

Counsel should be aware, however, that while the courts often recognize a statutory design defense as a bar to pure design claims, plaintiff's counsel typically mixes design and maintenance claims such as a design defect and an allegation of an improper failure to warn of a dangerous condition in the petition. Even when a state enjoys the statutory design defense (such as compliance with standards in effect at the time of construction) it may still be required to present evidence before a finder of fact as to whether its maintenance duties were properly performed.

2. Statutory Discretionary Defenses and Separation of Powers Issues

Many states have a law that limits the state's liability when it has exercised discretion, or in other words, when the engineers have used their engineering judgment. The issue of whether an agency has appropriately exercised its discretionary function is normally a question of law.

Separation of Powers Doctrine.—The executive branch of the government is responsible for adopting and publishing its own standards and policies. The doctrine of separation of powers ensures that government policy-making should not be subject to judicial review and has frequently been the subject of review by the U.S. Supreme Court. In 1880, the Court explained that one of the fundamental principles of government is the idea

> essential to the successful working of the system that the persons entrusted with power in any one of these branches shall not be permitted to encroach upon the powers confided to the others, but that each shall by the law of its creation be limited to the exercise of the powers appropriate to its department."[28]

Courts are still explaining this concept 130 years later.

In *Tolliver v. DOT,*[29] plaintiff alleged that the dangerous condition of the roadway was the DOT's failure to stripe it in a timely manner or the failure to use temporary edge markings. The Maine Tort Claims Act provides that "all governmental entities shall be immune from suit on any and all tort claims seeking recovery of damages" except as otherwise provided by statute.[30] Immunity is removed under the Act for claims arising from a governmental entity's performance of "[r]oad construction, street cleaning or repair."[31] In its defense, the State argued that the scheduling of striping was a discretionary function and therefore it had immunity from liability. The question the court considered was whether the acts and decisions of the government employee were "uniquely governmental" and therefore

[25] *Id*.

[26] K & W Elec., Inc. v. State, 712 N.W.2d 107, 114 (Iowa 2006).

[27] *Id*. at 113.

[28] Kilbourne v. Thompson, 103 U.S. 168, 190–91, 26 L. Ed. 377, 387 (1880).

[29] 2008 ME 83, 948 A.2d 1223 (Me. 2008).

[30] 14 ME. REV. STAT. § 8103(1).

[31] 14 ME. REV. STAT. § 8104-A(4) provides that

> a governmental entity is liable for its negligent acts or omissions arising out of and occurring during the performance of construction, street cleaning or repair operations on any highway, town way, sidewalk, parking area, causeway, bridge, airport runway or taxiway, including appurtenances necessary for the control of those ways including, but not limited to, street signs, traffic lights, parking meters and guardrails. A governmental entity is not liable for any defect, lack of repair or lack of sufficient railing in any highway, town way, sidewalk, parking area, causeway, bridge, airport runway or taxiway or in any appurtenance thereto.

immune from suit. The court noted that discretionary function immunity, like the legislative, judicial, prosecutorial, and State military immunity, "serves the important purpose of separation of power by preventing the judicial branch from entertaining tort actions as tools for manipulating important policy decisions that have been committed to coordinate branches of government."[32]

The *Tolliver* court discussed the separation of powers doctrine, stating that "the notion that the purpose of discretionary function immunity is to protect the separation of powers on important policy questions is supported by our case law on the subject, as well as the U.S. Supreme Court precedent."[33] In *Dalehite v. United States*, the Court examined the legislative history of the discretionary function immunity provision, noting that

> [W]hile Congress desired to waive the Government's immunity from actions for injuries to person and property occasioned by the tortious conduct of its agents acting within their scope of business, it was not contemplated that the Government should be subject to liability arising from acts of a governmental nature or function.[34]

The Court concluded that the acts of negligence by governmental employees alleged by the plaintiffs were immune from suit because they were "performed under the direction of a plan developed at a high level under a direct delegation of plan-making authority from the apex of the Executive Department." Accordingly, they were the kind of uniquely governmental actions to which discretionary function immunity applied.[35]

With that background, the *Tolliver* court examined the striping issues and found that immunity would apply if the acts were performed under the direction of a plan developed at a high level; if the challenged act involved a basic government policy, program, or objective; and if the act was essential to the accomplishment of the goal. The court also questioned whether the action required exercise of judgment or expertise. The court commented that the analysis it did in this case was important to prevent the judicial branch from using tort actions to manipulate the government's policy decisions, underscoring the importance of separation of powers.

Lessons learned. The rationale for design immunity is to prevent a judge or jury from second-guessing the decision of a public entity by reviewing the identical questions of risk that had previously been considered by the government officers who adopted or approved the plan or design. It is therefore important to develop a record that will satisfy the court that the proper reviewing and analyzing steps were taken to support the finding of a "discretionary" decision. The courts should strike a balance between safety, mobility, environmental, and historical interests, weighing the impacts of one against the other as long as they are able to review evidence that the agency did the same thing.

Considerations of public policy. In *United States v. Gaubert,*[36] the U.S. Supreme Court held that "[t]he discretionary function exception covers acts involving an element of judgment or choice if they are based on considerations of public policy. It is the nature of the conduct rather than the status of the actor that governs whether the exception applies."[37] Based on *Gaubert*, an argument can be articulated that immunity attaches to any conduct that involves the balancing of policy considerations, not merely the conduct of the agency's high-ranking officials. Under that theory, a designer would be entitled to discretionary immunity in a state that recognizes discretionary immunity as a defense, since he or she had to choose between competing societal interests such as cost and environmental concerns.

In a Vermont work zone case, *Johnson v. Agency of Transportation,*[38] the court held that the language in Section 6B.01 of the *Manual on Uniform Traffic Control Devices* (MUTCD)[39] does not prescribe a specific course of action for Department employees to follow, but rather requires them to exercise "an element of judgment or choice"[40] when selecting from competing temporary traffic controls. The court found that an employee's choice of temporary traffic controls was more than a ministerial maintenance decision because it was his or her responsibility to "ponder such things" as worker safety and road user safety, noting that the MUTCD vests the responsibility for temporary traffic control in "a public body *or official* having jurisdiction for guiding road users."[41] These job duties "regularly require judgment as to which of a range of permissible courses is the wisest."[42] Thus, the *Johnson* court found that the choice of temporary traffic controls was a discretionary function within the meaning of the Vermont Tort Claims Act and allowed the trial court's order granting summary judgment to stand.

However, in *Jorgenson v. DOT,*[43] the court refused an application by the State for summary judgment on the issue of the adequacy of a traffic control plan. The court concluded that the Department was not entitled

[32] *Tolliver*, 948 A.2d at 1229, citing Adriance v. Town of Standish, 687 A.2d 238, 240 (Me. 1996).

[33] *Id*. at 1229–30, citing Dalehite v. United States, 346 U.S. 15, 97 L. Ed. 1427 (1953).

[34] *Id* at 1230, citing *Dalehite*, 346 U.S. at 27-28.

[35] *Id*. at 1230, citing *Dalehite*, 346 U.S. at 42.

[36] United States v. Gaubert, 499 U.S. 315, 11 S. Ct. 1267, 113 L. Ed. 2d 335 (1991).

[37] *Id*. at 316.

[38] Johnson v. Agency of Transp., 180 Vt. 493, 904 A.2d 1060 (Vt. 2006).

[39] The U.S. Department of Transportation *Manual on Uniform Traffic Control Devices* (MUTCD) has been adopted by the State of Vermont as the standard for all traffic control signals within the state. VT. STAT. ANN. tit. 23, § 1025(a). *See Johnson*, 904 A.2d at 1062. The pertinent provision of § 6B.01 of the MUTCD "states that [t]he control of road users through a temporary control zone shall be an essential part of…maintenance operations." *Johnson*, 904 A.2d at 1064.

[40] *Johnson*, 904 A.2d at 1063.

[41] *Id*. at 1064, quoting MUTCD § 6A.01.

[42] *Id*. at 1066.

[43] 2009 ME 42, 969 A.2d 912 (Me. 2009).

to discretionary function immunity for the traffic control plan because no Department employees had engaged in "careful weighing of competing public policy considerations when determining when to complete the striping of the road and whether to use temporary edge line markings."[44] Rather, the Department employees were merely "assessing the logical and most efficient way to complete a road improvement project."[45] The court essentially said that not all decision-making is entitled to discretionary function immunity; only those more significant decisions involving the weighing of competing public policy considerations are entitled to immunity. The *Jorgenson* court acknowledged that many factors have to be considered to safely control the flow of traffic, including visibility, traffic volume, roadway layout, hills, curves, intersections, driveways, and speed limits, and that many choices can be made as to signs, shadow vehicles, flaggers, barriers, cones, drums, and message boards. The court simply did not acknowledge that those decisions are the types of decisions for which the Department was intended to have immunity from liability.

According to *Summer v. Carpenter,*[46] mere room for discretion on the part of the entity is not sufficient to invoke the discretionary immunity provision. Discretionary immunity is contingent on proof that the government entity, faced with alternatives, actually weighed competing considerations and made a conscious choice. Further, the entity must establish, in weighing the competing considerations and alternatives, that it utilized accepted professional standards appropriate to resolve the issue. In *Summer*, a legal malpractice claim against an attorney who failed to file a "dangerous road" claim against the DOT, the respondent presented evidence that indicated 1) the design used for the intersection was common and 2) while the respondent's expert would have selected another design, the chosen design was not wrong. According to the court, that evidence was not sufficient to establish that the highway department considered various design options for the intersection and then selected the chosen design plan after carefully weighing competing considerations. Therefore, summary judgment was not appropriate.

In *Matter of Estate of Siamak Hamzavi v. State of New York,*[47] the estate submitted an expert's affidavit that raised issues of fact as to whether a normal drainage ditch existed near the guide rail, what standards applied, and whether the design and construction of the guide rail, most particularly its length and end treatment, complied with the applicable standards. The court required the State to show that its plan was the product of a deliberative decision-making process and found against it when it could not show that thorough consideration of alternatives occurred.

> The testimony of the state's retired employee that employees in his design group would have reviewed the reconstruction plans and that someone would have checked the design for guiderails was insufficient to establish the adequacy of the process. Rather, there is a triable issue of fact whether the states' design and construction of the guiderail was the product of adequate study and a reasonable planning decision on the part of defendant or was instead negligent.[48]

In *King v. Landguth,*[49] a lawsuit that involved a sleeping driver who left the road and struck a box culvert, plaintiff's expert testified that the South Dakota DOT had adopted the Federal MUTCD and the *AASHTO Roadside Design Guide,* and, in his opinion, those standards required four markers, one on each corner, for a culvert of the type in question. The expert stated that these were clear policies that did not require any discretion. The State produced testimony that supported its application for summary judgment, citing the same policies that plaintiff's expert cited. However, unlike plaintiff's expert, the DOT employees claimed that the South Dakota DOT Policy required only two markers at this culvert. Because there was no clear guidance on the issue, the court found that the decision regarding the installation of additional markers was a discretionary function since it required engineering judgment to make a decision as to the correct application of the markers, and allowed summary judgment.

In *Davison v. State,*[50] the court reviewed the Iowa DOT's methodology of inspecting and maintaining the State's road system after a crash that was caused after a farm wagon became separated from the vehicle that was towing it. The plaintiff claimed the State was negligent 1) by failing to perform proper inspections of the highway, 2) by failing to adequately maintain and repair the highway, and 3) by failing to take reasonable measures to warn motorists of the dangerous conditions created by the badly deteriorated roadway. The court acknowledged that the State must weigh alternatives and make choices with respect to policy and planning. They worked through the following analysis:

- Was an element of judgment or discretion involved? We must first determine whether the State's actions were a matter of choice or judgment. If the State's conduct cannot be "appropriately the product of judgment or choice, then there is no discretion in the conduct for the discretionary function exception to protect."[51] Nearly all challenged conduct can be characterized as the exercise of some judgment or discretion as judgment is exercised in almost every human endeavor. The court concluded that the DOT's decisions regarding the performance of inspections, maintenance, and re-

[44] *Id*. at 18, quoting Tolliver v. DOT, 2008 ME 83, at 23, 948 A.2d 1223, 1231 (2008).

[45] *Id*.

[46] 328 S.C. 36, 492 S.E.2d 55 (1997).

[47] 43 A.D. 3d 1430, 843 N.Y.S.2d 896, 2007 NY Slip Op 7246 (N.Y. App. Div. 2007).

[48] *Id*. at 1432.

[49] 2007 SD 2, 726 N.W.2d 603 (2007).

[50] 671 N.W.2d 519 (Iowa App. 2003).

[51] *Id*.

pairs were matters of judgment left to the department's discretion.

• Is the challenged conduct of the nature the legislature intended to shield from liability? Immunity applies if the State's challenged conduct involved considerations of public policy.[52] The more the State's judgment involved policy-making, the more it is to be recognized as immune from judicial process. If the challenged conduct involved a high degree of discretion and judgment in weighing alternatives and making choices with respect to public policy and planning, the State would be immune from liability.

The court concluded that the discretion used in permitting the road to remain in poor condition was the type of discretion that the legislature intended to insulate from liability, giving the example that when a city decides whether to build a road, open a new street, or install highway guardrails, it may consider various social, economic, and political policies. It may weigh competing needs of pedestrian safety, engineering concerns, commerce, traffic flow, and limited financial resources. Likewise, the DOT's decisions as to inspecting and maintaining the system involved weighing alternatives and making choices regarding public policy and planning and was a protected decision.

Lessons learned on discretionary immunity. Discretionary immunity can be a valuable tool in defense of an agency's decision, but it attaches only if the state can prove that it actually considered several alternatives and chose the one that was used based on engineering judgment, competing policy, and after weighing of all appropriate factors. One factor that can be very important to the defense is the agency's policy on flexible design. As discussed in Section II, if the direction for flexible design is given by the legislature or the agency's governing body, courts will likely recognize it for what it is—a policy that was given much thought, debate, and judgment, evaluating societal factors such as economics and historical value, paving the way for the discretionary immunity defense.

It is important to be able to provide a documented, rational, detailed explanation of the design when the agency has deviated from generally-accepted guidelines. That documentation may include meeting minutes; design exception materials that explain how safety, historical, or environmental significance were addressed using mitigation features such as guardrails or rumble strips; or engineering studies. The court will require evidence that the right person or persons, usually a professional engineer, made the decision to deviate from the standards.

3. Compliance with Internal or External Standards or Policy

Applicable guidelines/standards/policies should be identified and studied so that an appropriate defense can be prepared. Guidelines considered to be authoritative include the AASHTO "Green Book",[53] the *Roadside Design Guide,*[54] FHWA's *Flexibility in Highway Design*,[55] the AASHTO *Highway Safety Manual,*[56] and applicable state guidelines or policies. As the use of flexible design principles becomes more commonly accepted, it is likely that counsel will infrequently have the defense of strict compliance with generally-accepted guidelines such as the federal publications. Counsel should, however, always review the text of the generally-accepted guidelines for language such as "range" of acceptable practice, "engineering judgment," and "flexibility" because those phrases may in fact be the basis of their defense. The defense of the claim can be based upon the premise that federal guidelines are flexible to a point and that the policy written and accepted by the state is the policy that should have been followed.

Counsel should review internal policies *before* litigation occurs to determine if the policies could or should be modified to better reflect actual practices in the field. If an unfavorable policy is in place at the time an accident occurs, it will be very difficult to explain to the trier of fact that reasonable care was taken or a dangerous condition of the road did not exist if the condition is specifically prohibited by the policy. For instance, in Missouri, internal policy requires that a clear zone of at least 30 ft be maintained on Interstate highways. However, there are locations in Missouri where a clear zone is not maintained as the State does not own enough right-of-way to maintain that clear zone. Should an accident occur in one of those locations, plaintiffs would prove that the State was not in compliance with its own policies and a jury could easily make the leap that the road was therefore in a dangerous condition. If Missouri were to modify the policy to indicate actual field conditions, i.e. a clear zone of 30 ft is required only if the State actually owns 30 ft of right-of-way, the claim would be more easily defended.

Martin v. Missouri Highway and Transportation Commission[57] involved a claim that the Missouri Highway and Transportation Commission (MHTC) failed to comply with its own clear zone policies. There was testimony in the case that MHTC had adopted a policy to require clear zones on its roads in conformance with a 1967 American Association of State Highway Officials publication and that the road where Ms. Martin was killed was not in compliance with the policy. The jury found in favor of plaintiff and awarded damages, which on appeal were allowed to remain. The significance of the case, however, is that Missouri courts have taken

[52] *Id*.

[53] Available for purchase through the AASHTO publication Web site at http://downloads.transportation.org/aashto_catalog.pdf.

[54] Available for purchase through the AASHTO publication Web site at http://downloads.transportation.org/aashto_catalog.pdf.

[55] http://www.fhwa.dot.gov/environment/flex/index.htm.

[56] Web site available at http://www.highwaysafetymanual.org/Pages/default.aspx.

[57] 981 S.W.2d 577 (Mo. App.W.D. 1998).

judicial notice of testimony in *Martin* that the State's policy was to provide a clear zone of 30 ft, when, in fact, the clear zone policy only applies to some heavily-traveled routes. Since *Martin* is the only reported case in Missouri dealing with State highways and clear zones, the case presented problems for MHTC until State policy was rewritten to more accurately reflect conditions in the field.

In *Perkins v. Ohio Department of Transportation,*[58] on plaintiff's appeal of an unfavorable verdict, the Department had adopted its own internal version of the MUTCD. Plaintiff identified five failures of the Department to comply with its design and traffic standards. The court noted that once the Department adopted the standard, it was required to comply with it, and further noted that the Department, in fact, failed to comply with several of the requirements. But even though plaintiff proved a violation of policy, she failed to prove that the policy violation caused the accident. The court noted that "negligence per se does not equal liability per se."[59] Even though plaintiff proved a dangerous condition, she did not prove that the dangerous condition was the proximate cause of her accident.

Unfortunately, compliance with generally-accepted standards does not necessarily guarantee that the state or its contractors will be found free of fault. In *Schmidt v. Washington Contractors Group, Inc.,*[60] Schmidt's injuries occurred when he crashed his motorcycle in a construction zone. The court noted that the construction company was required to use ordinary care in maintaining the road construction site in a reasonably safe condition. The construction company argued that it was not negligent as it properly had posted warning signs as required by the MUTCD. The court stated that "evidence of compliance with the MUTCD does not necessarily establish due care because the MUTCD, like any other national industry standard or code, is only a minimum standard." This case is important because it highlights the lesson that guidelines must be applied with careful analysis. It is not sufficient to blindly follow provisions in a manual: the provisions in the manual must be used in conjunction with engineering judgment and common sense.

In *Johnson v. Agency of Transportation*,[61] plaintiff argued that the MUTCD specifically required an employee to consider the volume of traffic, the complexity of the intersection, and road user safety before choosing to employ flashing lights as a temporary traffic control. Plaintiff noted that Section 6B.01 of the MUTCD stated that "[t]he control of road users through a temporary traffic control zone shall be an essential part of…maintenance operations."[62] The court found that the MUTCD provision relied upon by plaintiff merely suggested that department employees "will have to make discretionary judgments about how to apply concretely the aspirational goal embedded in the statement."[63] The court allowed testimony regarding the use of reasonable engineering principles rather than a strict adherence to the language of the MUTCD and affirmed the trial court's grant of the State's motion for summary judgment.

Counsel should consider cases such as *Perkins* and *Johnson* when defending defective design cases. Even though it was apparent that deviations from the guidelines occurred, the agency was successful in proving that the road was reasonably safe and that the violations of the policy did not cause plaintiff's injuries and subsequent damages.

Lessons learned. The MUTCD and other references are guidelines, not cookbooks. Guidelines often contain the terms "shall," "may," and "should," which must be applied using reasoned engineering and common-sense principles. The Green Book[64] contains a statement that reads

> [t]he intent of this policy is to provide guidance to the designer by referencing a recommended range of values for critical dimensions. It is not intended to be a detailed design manual that could supersede 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.

Statements such as these, taken from the national publications, should feature prominently in the state's argument in favor of its motion for summary judgment or in the state's examination of expert witnesses.

4. Balancing Factors/Flexible Design Legislation

Compliance with "balancing factors" state law. Fifteen states responding to our survey currently have a law that in some fashion supports the agency's use of balancing factors or flexible design in the design phase of a project. Some of the statutes, such as Hawaii's, specifically allow the DOT to select or apply flexible design principles, and then provide immunity to the state and its employees if the flexibility is used. The legislative history of the Hawaii law indicates that the legislature specifically found that flexible designs were not any less safe than earlier engineering practices and that the concept simply takes a "broader range of considerations" into account. The DOT was directed to develop guidelines and adopt a procedure that would provide documentation of the process and reasoning that led to the design decision, including the circumstances of each project, the choices available, and the considerations reviewed, as well as a complete explanation for the decision itself. The DOT was also required to incorporate

[58] 65 Ohio App. 3d 487, 584 N.E.2d 795 (1989).

[59] *Id.* at 495, citing Merchants Mutual Ins. Co. v. Baker, 15 Ohio St. 3d 316, 15 OBR 444, 473 N.E.2d 827 (1984).

[60] Schmidt v. Wash. Contractors Group, Inc., 290 Mont. 276, 964 P.2d 34 (Mt. 1998).

[61] 180 Vt. 493, 904 A.2d 1060 (2006).

[62] *Id.* at 495.

[63] *Id.*, quoting Shansky v. United States, 164 F.3d 688, 691 (1st Cir. 1999).

[64] 2004 Green Book, p. xliii of the Foreword.

qualitative and safety studies in the design when possible.[65]

Other state laws simply support the use of CSD principles. Connecticut's statute only applies to bridge design, while Delaware requires the State to use the principles when considering landscaping on right-of-way. Kansas has statutorily implemented a system called "Practical Improvements," which is similar to the Practical Design concept statutorily adopted by Oregon.

The laws are fairly new, and currently none have been challenged in the court system. If counsel is lucky enough to have a state law that favors the use of flexible or practical design, an appropriately-supported motion for summary judgment should frequently be successful.

A matrix that summarizes those laws can be found in Appendix C.

Defending the design with the balancing factors analysis. While the CSD statutes have not yet been challenged in court, once that occurs, one of the most successful ways of defending the case will likely be to use evidence that each of the competing factors, i.e., cost, environmental, and safety concerns were carefully considered in choosing the course of action that was taken. For example, if a design defect were brought against a state that sanctions the balancing factors analysis, expectations would be that the design documentation contain, at a minimum, the documents identified in the legislative history, i.e., documentation of the process and reasoning that led to the decision, including the circumstances of each project, the choices available, and the considerations reviewed, as well as a complete explanation for the decision itself. If these items were not contained in the design file, the agency would likely not be able to show that it complied with its law or policy, and thus the agency would not be able to shield itself with the immunity provided in the statute.

The balancing factors analysis was used by the court in *Butler v. State*.[66] Plaintiff Butler was injured when his vehicle collided with a guardrail that had not been upgraded to comply with newer standards when the newer standards were adopted. The State defended the case on the basis that the road was reasonably safe, and appealed when the trial court found that the State was negligent as a matter of law for failing to upgrade the guardrail. The court discussed the "reasonableness" of the State's decision, and noted that the State must balance such factors as 1) the danger imposed by the outdated device; 2) the increase in safety the new device or design would provide; 3) the cost of upgrading; 4) the State's available resources; 5) other known hazards that pose a greater danger to motorists; and 6) any other factors, including other needs in the highway system. The *Butler* court reasoned that while the State was likely aware of components in its network that were outdated, it had a limited budget with many competing demands, and had to prioritize the needs of the entire system and maximize the use of its limited funds to best serve all the traveling public.

In *Estate of Gage v. State of Vermont,*[67] it was alleged that the State should have placed a guardrail near the edge of its right-of-way, which would have prevented a fatal accident. An appeal followed after the State's motion for summary judgment based on design immunity was denied. The court noted that Vermont's tort law was patterned after the Federal Tort Claims Act and looked to cases that interpreted that Act for guidance. The *Gage* court noted that federal agencies were allowed to consider factors such as the risks of the safety measures themselves, cost/benefit analysis, and aesthetic considerations when evaluating whether a particular measure such as a guardrail was appropriate.[68] Federal agencies also were allowed to consider factors other than safety such as aesthetics, environmental impact, and available financial resources in making a determination as to whether a guardrail should have been installed.[69] The *Gage* court found that the summary motion should have been granted.

In the case of *Riley v. United States of America,*[70] the U.S. government prevailed when the court found it lacked jurisdiction due to sovereign immunity. Riley's sight distance was obscured by mailboxes placed by the U.S. Postal Service. He pulled onto a State highway at an intersection and was struck by an oncoming vehicle. Riley argued that the Postal Service had no discretion to locate mailboxes and that the government was bound by the AASHTO Green Book, which states "[a]fter a vehicle has stopped at an intersection, the driver must have sufficient sight distance to make a safe departure through the intersection area."[71] The appellate court found that the Green Book provisions were mere guidelines, noting that "despite the alleged nonconformance with certain AASHTO standards, the United States Postal Service is charged with balancing a mix of factors such as cost and safety."[72] The court further noted that the judgment of where to locate the mailboxes is of the kind that the discretionary function exception was designed to shield, stating that the agency was simply balancing personnel, efficiency, economy, and safety by choosing curbside delivery at the U.S. 63-Christopher intersection, as opposed to other locations and modes of delivery.

In *Martinez v. Grant County Public Utility District No. 2,*[73] a case where a worker was electrocuted when he lifted a metal pipe that made contact with a high-

[65] Flexibility in Highway Design, Hawaii, L 2005, c 185, § 2; am L 2006, c 70, § 1.

[66] 336 N.W.2d 416 (Iowa 1983).

[67] 178 Vt. 212, 882 A.2d 1157, 2005 VT 78 (2005).

[68] *See also* Elder v. United States, 312 F.3d 1172 (10th Cir. 2002).

[69] *See* Bowman v. United States, 820 F.2d 1393 (4th Cir. 1987).

[70] 486 F.3d 1030 (8th Cir. 2007).

[71] *Id*. at 1033.

[72] *Id*.

[73] 70 Wash. App. 134, 851 P.2d 1248 (1993).

voltage wire, the jury weighed several competing factors before finding in favor of the utility. Plaintiffs introduced evidence that an electrocution could have been avoided if the Public Utility District (PUD) had raised its transmission lines higher, buried the lines, used insulated wire, or fenced the land under the lines. In response, the PUD introduced evidence that the transmission lines were built to substantially exceed then-existing safety standards and that those same standards were still in effect when the accident occurred. The PUD further presented testimony that plaintiff's proposed remedial measures would not have reduced the overall hazards, were not feasible, or would reduce reliability of the system, in addition to evidence of the overall costs of implementing each of the plaintiff's proposed safety measures and the impact those increased costs would have on ratepayers. After considering the evidence, the jury found the PUD was not negligent, and the verdict was affirmed on appeal.

Lessons learned. To base a successful defense on the theme that the state complied with a state law that allowed flexible or context sensitive factors to be considered in determining a design, courts will require evidence that the factors were actually applied and that the designer really weighed the pros and cons of the design options. Since typically many years pass from the time that the plans are initially conceived, the road is built, and the accident that spurs the litigation occurs, documentation of the decision-making process is essential. Courts will look for evidence that the agency consciously balanced alternatives, taking into account safety, economics, adopted standards, and recognized engineering practices. In order for a motion for summary judgment to be successful, adequate documentation that the design complied with reasonable engineering principles will be necessary.

5. Road Reasonably Safe Defense

Proving the reasonableness of the design and that the road was reasonably safe. In some states, the discretionary and state-of-the-art defenses are not available or applicable and counsel will have to present a defense that the road was reasonably safe.

Review the law. Analysis will likely begin with applicable state law. Many counsel begin their case preparation by outlining the facts that plaintiff has to prove to present a case to the trier of fact. A good resource is the state's approved jury instruction handbook. For instance, in Missouri,[74] the pertinent "waiver of sovereign immunity" approved jury instruction reads as follows:

> Your verdict must be for plaintiff if you believe:
>
> First, (describe the alleged dangerous condition), and as a result the road was not reasonably safe, and
>
> Second, defendant knew or by using ordinary care could have known of this condition in time to warn of such condition, and
>
> Third, defendant failed to use ordinary care to warn of such condition, and
>
> Fourth, as a direct result of such failure, plaintiff sustained damage.

A design defect case could be defended in many ways. For example, if the defect alleged is the failure to provide a clear zone, several arguments could be made. One defense is simply that the road was reasonably safe even though it did not have a clear zone. This could be shown by the lack of other similar accidents or a low accident ratio. The case could be defended by arguing that plaintiff's damage was not a direct result of the lack of clear zone but was the direct result of plaintiff's failure to use the highest degree of care in operating the vehicle.

After review of the claim, counsel should gather all the pertinent information such as crash history, traffic volume, prevailing speed, design standards or policies, design documentation, photos, video, witness statements, and other data relevant to the claim. Once the information is located, it must be studied carefully and themes developed to defend the claim. Possible themes include responsibility to the traveling public and taxpayers (if allowed), the road is reasonably safe, and the state used ordinary care.

Identify applicable guidelines/standards/policies. These may include the AASHTO Green Book[75] and *Roadside Design Guide,*[76] FHWA's *Flexibility in Highway Design,*[77] the MUTCD,[78] the AASHTO *Highway Safety Manual,*[79] and the agency's internal policies.

Engineering judgment. The agency's defense must be based, at least in part, on the design engineer's use of engineering judgment. The MUTCD defines engineering judgment[80] as the

> evaluation of available pertinent information and the application of appropriate principles, provisions, and practices as contained in this manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer.

Witnesses will need to explain how engineering judgment and engineering principles were appropriately applied.

Defend the design of the road. The attorney must develop a rational and (optimally) documented explana-

[74] Missouri Approved Instruction 31.16.

[75] Available through the AASHTO publication catalog, http://downloads.transportation.org/aashto_catalog.pdf.

[76] Available for purchase from AASHTO bookstore at https://bookstore.transportation.org/category_item.aspx?id=DS.

[77] http://www.fhwa.dot.gov/environment/flex/index.htm.

[78] Available at http://mutcd.fhwa.dot.gov/.

[79] Web site available at http://www.highwaysafetymanual.org/Pages/default.aspx.

[80] MUTCD 14 (2009 edition), available at http://mutcd.fhwa.dot.gov/.

tion for the design of the road. The defense has to be able to articulate the basis for the selection of the particular design and explain why the selected design was the best one for the traveling public. If the state has a policy that includes the incorporation of the balancing factors as part of the design process, that policy should be reviewed and a defense formulated based on the policy in effect at the time the road was designed or upgraded.

Because the road may have been designed years or decades previously, the attorney's best friend will be documentation of the decisions made at the time the road was improved. Counsel should be able to present evidence that factors such as safety, environmental impact, and cost were all reviewed and considered prior to choosing a particular design. Careful consideration of alternative designs and mitigating strategies should be shown if possible. Affidavits by an expert or deposition testimony from an expert must be used to support the defense of the case in a motion for summary judgment. If a motion for summary judgment is unsuccessful, the case will be defended to a jury or arbitration panel and the experts will be asked to defend their conclusions again. The best expert witness may be a staff engineer, an outside expert, or a combination of both. If it is not possible to show documentation of the engineering decision or provide testimony regarding what decisions were made and why, a possible solution is to have a safety study or accident analysis study of "before" and "after" the changes to the road to show that the safety was indeed increased after the road improvements.

Create a trial preparation timeline. One of the best ways to make sure that an important aspect of the trial is not missed or overlooked is to use a timeline or checklist.[81]

The following is an example that can be used for trial preparation.[82]

Months before trial	Organize pleadings/discovery documents for use at trial. Contact experts with dates of trial. Consider the use of a jury consultant. Consider bench or jury trial if option is available.
4–6 weeks before trial	Review the pleadings. If still permitted, file any additional necessary pleadings. Review discovery. If permitted, supplement discovery. Formulate motions *in limine*. Begin preparing and serving witness subpoenas. Know the judge and courtroom conditions. Confer with opposing counsel regarding pre-trial issues; if needed, obtain assistance of court.
3–4 weeks before trial	Create a trial notebook. Prepare jury instructions. Prepare exhibit folders. Prepare witness folders. Prepare exhibit binder for judge if required. Consider courtroom exhibits.
1–2 weeks before trial	Discuss and finalize potential stipulations with other parties. Prepare trial briefs. Prepare witnesses for testimony and courtroom presence. Maintain contact with witnesses and prepare them for testimony. Contact court and confirm trial date.
The week before trial	Finalize witness preparation. Review the order of witnesses; continue preparation of witnesses. Revisit cross-examinations and opening and closing statements; rehearse. Confirm all logistical and transportation arrangements. Double-check supplies and equipment.

IV. DESIGN DOCUMENTATION CURRENT PRACTICES

This section includes a discussion of risk analysis, model design exception and deviation procedures, and documentation procedures and practices. Engineering staff should consider the following:

[81] Reena M. Sandoval & Jane K. Manning, *The Trial Lawyer's Motto: Be Over-Prepared*, AMERICAN BAR ASSOCIATION'S TRIAL PRACTICE 9 (2005), http://apps.americanbar.org/Litigation/committees/trialpractice/docs/gratis_spr05_triallawyer.pdf.

[82] *Id*. The table is a modified version of the one that appears in the publication.

A. CURRENT PRACTICES FOR RISK MANAGEMENT

How much risk can the state accept? The risk analysis[83] below may be helpful initially in evaluating design options and setting up a documented file. Once the decision has been made to balance safety against other factors such as cost and environmental impact, it will be necessary to periodically evaluate projects and roads to determine whether the tradeoff was worth the risk taken. For instance, when the community requests that a large beautiful tree be left in place, if that tree is repeatedly struck even though mitigation steps such as rumble strips or barriers were used, the tree may need to be removed or the protection enhanced. A system should be set up that will evaluate the mitigation strategies that were used to ensure that they are effective. Periodic safety studies or accident studies could also be done to ensure adequate performance of the design features.

- *Consider Multiple Alternatives*. Thorough consideration of alternatives, including an explanation as to the reasons a full standard design may not be possible or desirable, and what alternatives exist, represent good risk management practices.
- *Evaluate and Document Design Decisions*. Design reports should document the expected operational and safety performance of the proposal. Stakeholder engagement, including developing, evaluating, and discussing different alternatives, requires documentation. All documentation can and should be readily available to place in project files for later reference. Special care should be taken where a new or creative concept is proposed such as a roundabout or traffic calming feature. If a design exception is needed, documentation should be complete, including a full description of the need for the exception based on adverse effects on community values, the environment, and any other pertinent factors.
- *Maintain Control Over Design Decision-Making*. The agency must stay in control of decisions regarding basic design features or elements. Active stakeholder involvement and input does not translate to abrogation of the responsibility of the agency to make fundamental design decisions.
- *Demonstrate a Commitment to Mitigate Safety Concerns*. Where a design exception or unusual solution is proposed, plan completion should focus on mitigation. Decisions to maintain trees along the roadside, for example, may be accompanied by special efforts to delineate the edge line and trees, implement shoulder rumble strips, or provide a guardrail or other roadside barriers.
- *Monitor Design Exceptions to Improve Decision-Making*. A few states make a special effort to keep a record of design exceptions by location, committing to review their safety performance over time. The intent is not to second-guess a decision, but to build on and improve a knowledge base for future decisions regarding design exceptions.

[83] *See* TIMOTHY NEUMAN, MARCY SCHWARTZ, ET AL. NCHRP 480: A GUIDE TO BEST PRACTICES FOR ACHIEVING CONTEXT SENSITIVE SOLUTIONS 51 (2002), http://contextsensitivesolutions.org/content/reading/nchrp-report/.

B. CURRENT PRACTICES—DOCUMENTATION OF THE DESIGN ANALYSIS

1. Statutes of Limitation and Records Retention

In most states, statutes of limitation do not exceed 5 years for personal injury or wrongful death claims, and the agency does not necessarily keep documentation of accident scenes or work diaries for more than the statutory period. When planning to defend a design claim, it is important to remember that the agency may have to defend a road or road design that has been in place years or even decades. For that reason, counsel must ensure that the agency has a records retention policy in place that ensures important design documentation is kept and accessible even though technology may change.

2. Documentation of the Deviation from Standards Process

Each responding agency indicated that it had a formal design exception process and provided copies of or Internet links to that process. Most agencies use a letter format with an analysis of each pertinent part, i.e., the purpose of the project, the type of exception requested, the purpose of the exception, and the expected benefits of the exception.

Survey Results.—Questions such as "What documentation process is used by the agency for documenting decisions that deviate from the generally accepted guidelines?" and "What documentation is developed while the project is being scoped and designed?" were asked in the survey. In response, most agencies attached forms that they used or links to a process they used, typically found in their design manuals. For example, Delaware requires an analysis of the following factors in its design documentation file:

- Existing roadway characteristics.
- Analysis of required versus proposed design criteria.
- Comparison of required versus proposed cross sections.
- Supporting calculations/analysis.
- Analysis of the effect of the project on new and proposed right-of-way.
- Environmental effect.
- Analysis of proposed mitigation steps and how the steps offset the variance.
- Costs of mitigation.
- The support or opposition of the public to the proposal.

Generally, the agencies responded that their processes consisted of several layers of review that must

occur before a variance to generally-accepted standards is presented to the chief engineer or his or her counterpart. In Connecticut, the layers of review include evaluation by the initial design squad; then review by a core team that consists of professionals from design, right-of-way, construction, and maintenance; and only then a review by a management team.

In Florida, as in most states, several alternatives are considered before the agency chooses a "preferred" design. The following engineering information is gathered, and an evaluation matrix is prepared for each alternative:

- Conceptual design plans.
- Survey information.
- Analysis of existing conditions.
- Analysis of safety issues.
- Typical sections, drainage, and floodplains.
- Maintenance issues.
- Estimated right-of-way and construction costs.

Several comprehensive forms used by the agencies to select or document their decision-making processes are included as Appendices D (Iowa), E (Iowa), F (Delaware), and G (Tennessee).

3. Specific State Examples of Procedures

The Georgia Department of Transportation (GDOT) uses the definitions and processes listed below when evaluating and analyzing its proposed designs.[84] These definitions are helpful when defending claims for the agency because they illustrate that much thought and debate occurs before a design exception can be approved. The definitions illustrate the importance of choosing the best design solution to a design problem and that the agency emphasizes the importance of engineers applying "engineering judgment."

- *Standards:* A standard is a required criteria or mandatory practice. Criteria denoted as standards have been identified by the Department as having substantial importance to the operational and safety performance of a roadway such that special agency review and approval (Design Variance or Design Exception) will be required before deviation from the controls can be incorporated into a design. The approval of a Design Variance from the GDOT Chief Engineer is required to document a decision to deviate from GDOT criteria that has been identified as "standard" before the design element or feature can be retained or incorporated into a project. The approval of a Design Exception from the GDOT Chief Engineer is required to document a decision to deviate from AASHTO criteria that FHWA has identified as "controlling criteria" before the design element or feature can be retained or incorporated into a project.
- *Guidelines:* Guidelines suggest normal practice with options and advisory conditions. Guidelines are recommended practices in typical situations. Deviations from the criteria denoted as guidelines are allowed when engineering judgment or study[85] indicates the deviation to be appropriate. Adequate study, justification, and documentation by the GDOT office or consultant responsible for the engineering are required when a deviation to a guideline is proposed.

Iowa Design Manual.—Excerpts from Iowa's design manual can be found in Appendices D and E. The sections deal directly with selecting and documenting design criteria. "Working Within Constraints" describes the financial constraints most state transportation agencies are currently facing. Iowa recognizes that, to do a project, the road may need to be designed using values that are below preferred design criteria simply to meet budgetary concerns. Under that scenario, serious consideration is given to variables such as the type of road, the degree of variance from the recommended values, the effect of the variance on the safety and operation of the facility, and whether mitigating features can offset the issues that could be caused by a deviation from the design standard. Safety is clearly a high priority, as the following statement is found in the policy: "[s]afety repairs should be addressed whenever possible. Expecting safety repairs to be included in future resurfacing projects can lead to a steady degrading of the highway system as repairs are continually delayed." The policy aids the agency in defending design claims because it demonstrates that safety is a high priority in the project selection and design process but also recognizes that real economic constraints must be considered during the design phase. These excerpts should assist the agency in explaining that it balanced the factors noted above, and the "whenever possible" language is loose enough to allow the agency to exercise its engineering judgment in determining when safety repairs should be addressed.

Delaware Design Manual.—Excerpts from Delaware's design manual can be found in Appendix F. The section instructs staff how to determine when a "departure from standards" is necessary and how to document that decision effectively. The forms are used to document decisions on design criteria, but it is expected that the primary focus of the exception request should be highway safety. The documentation that is required

[84] Survey response, Georgia DOT, May 2011.

[85] "Engineering Judgment" is defined by the MUTCD as "the evaluation of available pertinent information and the application of appropriate principles, provisions contained in this manual and other sources, for the purpose of deciding upon the applicability, design, cooperation, or installation of a traffic control device." MUTCD 14 (2009 edition). Engineering study is defined in the 2009 MUTCD as

> the comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by an engineer. An engineering study shall be documented.

will be helpful to the agency facing a design defect allegation because it addresses such issues as public input, environmental effects, and cost, illustrating that the agency considered the pros and cons of each of its decisions prior to implementing any of them.

Tennessee's Design Exception and Justification form is included in Appendix G as an example of a form that requires multiple narrative responses that leave room for analysis of factors such as "long-term effect" of the reduced design, "difficulty obtaining the full standard," and "safety mitigation measures considered." Staff can then determine whether the measures taken can be justified or whether there is a true effect on the facility.

Connecticut has the following procedures: The designer will not request an exception to controlling design criteria until he or she has evaluated the impacts of providing the minimum or better design values. If these impacts are judged to be unacceptable, then the designer can initiate the exception process. The designer's goal will be to identify and seek approval of design exceptions as early in the final design phase as practical. This procedure is included in this digest because it illustrates a thorough process that identifies all the "balancing factors" that are considered by the agency and requires a discussion of each of those factors that are important.

The following establishes the procedures the highway designer should follow for all proposed exceptions to the department's established design criteria:

> 1. The designers should present information to demonstrate the impacts of meeting the minimum or lower design criteria. This can include but is not limited to:
>
> a. Construction costs,
>
> b. Environmental consequences,
>
> c. Right of way impacts, and
>
> d. Community involvement/concerns.
>
> 2. The designer should provide sufficient information to demonstrate the consequences of using a design value that does not meet the minimum criteria. Where appropriate, this may include but is not limited to:
>
> a. Impacts on traffic serviceability (i.e., level of service),
>
> b. Impacts on safety (i.e., crash history),
>
> c. Impacts on traffic operations, and
>
> d. Impacts on future maintenance.
>
> 3. The designer should prepare a written summary of the information and submit it to the appropriate Division Manager for review.
>
> 4. The designer will then arrange a meeting through the office of the Engineering Administrator to discuss all proposed design exceptions. The Engineering Administrator, Division Manager, and the Project Manager and/or Engineer will usually attend the meeting. The FHWA will also be represented for projects that require full FHWA oversight.[86]

Recommendations and lessons learned from state documentation. A lawsuit based upon an alleged "dangerous condition" of a roadway due to a design defect will necessarily contain allegations of the agency's failure to comply with generally-accepted standards and engineering principles. However, according to the text of the current standards and guidelines, those standards and guidelines are now flexible. The books contain words such as "ranges" of acceptable values and "engineering judgment." The agency that based its design on flexible design principles must be able to support the design by explaining that, even though recommended values were not necessarily achieved, the project as a whole was designed and constructed according to the values of the community and the carefully considered policy of the agency's governing authority.

It is important to document all the public input and context-related information that is gathered and used in determining the design of the road. If the agency has adopted a formal policy that requires or suggests the use of the balancing factors process, and in fact that process is used to support a decision to leave a historical landmark or large tree in place or to widen lanes rather than add a lane, the basis of those decisions must be documented. That documentation in particular will be critical to the defense of a case when it is alleged that plaintiff was injured due to inadequate mitigation measures being taken by the agency.

Discussion of the following topics in the project documentation could be used:

- What are the most important reasons for this project?
- How was community input on historical, safety, mobility, and environmental aspects gathered and addressed?
- Will the project as designed be durable and economical to maintain?
- Does the project incorporate community development plans?
- How does the project address sites listed on the state or national historic register?
- How was access for bicycle and pedestrian transportation addressed?
- How was access to culturally significant sites addressed?

Each of the above-noted procedures is useful in developing or reworking documentation processes. The policies indicate the importance of the initial public input process and the value of working with the public to determine what goals they want to achieve. Each agency has a process in place where public input is studied and the best design, based on the economic, historical, environmental, and safety factors involved.

[86] http://www.ct.gov/dot/lib/dot/documents/dpublications/highway/cover.pdf.

Most of the procedures specifically outline safety as being a high priority and require detailed supporting authority for safety-related deviations from standards. All the states noted particular attention to the documentation of all the safety aspects of the project. Careful analysis of the types of accidents that occurred prior to the project is required and thoroughly documented. If the recommended values are not used in the new design, the mitigation strategies that were instead employed must be thoroughly documented and discussed.

C. Documentation of Mitigation Strategies

If a project cannot be designed to meet the full values recommended in AASHTO or internal publications, designers should consider how mitigation strategies may help to reduce safety or operational problems. The following chart is included in Washington State's Project Development Manual.[87] This chart is an excellent checklist or guideline for a designer to use when evaluating mitigation strategies and as a beginning point for the documentation that is necessary to include in the permanent file.

[87] http://www.wsdot.wa.gov/publications/fulltext/projectdev/Deviations/DeviationMitigation.pdf.

Deviation Mitigation Options for Designers

Design Criteria	*Mitigation Measures Available*	*Comments*
Horizontal Alignment	Post Warning Signs Post Speed Advisory Install Chevrons Flatten Roadside Slopes Improve Horizontal Sight Lines Improve Clear Zone Area Improve Superelevation Install Illumination Widen Shoulders/Pavement	Consistency of mitigation choices through significant lengths of corridors is encouraged in order to avoid confusing drivers.
Lane Width	Post Warning Signs or Speed Advisory Improve Delineation Install Raised Pavement Markings Restrict Vehicle Size if Appropriate Restrict Traffic if Appropriate	Permanent lanes on the Interstate system must meet or exceed 11' minimum width to comply with FHWA criteria.
Shoulder Width	Flatten Roadside Slopes Improve Delineation Identify and Post Alternate Bicycle Route Consider Installing Rumble Strips Post Warning Signs Provide Occasional Turnouts	Consider routing pedestrians to use an alternate route.
Bridge Width	Post Warning Signs Improve Delineation Post Speed Advisory Upgrade Bridge Barriers Identify and Post Alternate Bicycle Route Restrict Vehicle Size if Appropriate Restrict Traffic if Appropriate	Consider routing pedestrians to use an alternate route. Bridge Office input is encouraged.
Structural Capacity	Post Warning Signs Post Load Limit Signs Restrict Vehicle Size if Appropriate Restrict Traffic if Appropriate Identify and Post Alternate Route	Bridge Office input is mandatory.

Stopping Sight Distance	Remove Obstructions Post Advisory Speed Post Warning Signs Consider Installing Illumination Relocate Intersections/ Access Points Improve Horizontal Sight Lines Install Advance Flashing Warnings Widen Shoulders/Pavement Flatten Roadside Slopes	Illumination is not typically effective as mitigation in crest vertical curve situations. Posting "reduced sight distance" signs is not effective. If warning signs are placed, the hazard that is hidden should be identified, such as narrow bridge or intersection ahead, for example.

V. CONCLUSION

CSD, Practical Design, and CSS are by-products of the need to emphasize safety, durability, maintainability, and cost in roadway design. Past generations of highway designers primarily relied on the "cookbook" method of designing highways, strictly adhering to the engineering methodology outlined in various reference manuals. The CSD process does not create new standards; it merely allows the designer to be flexible by incorporating the principles that are found in the *Roadside Design Guide* and *A Policy on Geometric Design of Highways and Streets*.

The CSD process allows and encourages flexibility in the scoping and design phases. Many states have developed policies that encourage and even require staff to balance multiple factors during the design phase of the project. It is important for counsel to review the policies and make sure, first, that the policies are beneficial to the organization from a litigation standpoint and, second, make sure a process is in place to ensure that the policy is followed and steps are appropriately documented. An entire section of this digest is devoted to developing appropriate documentation during the design phase of the project in preparation for litigation.

Additionally, this digest is intended to assist counsel in formulating successful design defense strategies in cases where generally-accepted standards of road design were not strictly followed but the road was reasonably safe. These strategies include motions for summary judgment based upon the law, and the use of a framework for defending a "reasonably safe" road case to a jury.

The best and most certain means of successfully defending a tort claim is a motion to dismiss or a motion for summary judgment based upon statutory discretionary immunity, statutory immunity based upon reliance upon generally-accepted standards, or statutory immunity based upon "balancing factors." If that method of defense is not allowed under applicable law, the practitioner will necessarily rely upon some variation of the defense that the road was "reasonably safe." That can be shown by documentation of site conditions at the time of the crash combined with documentation done at the time of the design that shows that appropriate engineering judgment was exercised in the design and execution of the plans.

At the time of publication of this digest, 15 of the 28 states that responded to our survey had enacted legislation that encourages their DOTs to implement context sensitive or practical design programs. In some states, the concept is encouraged only for bridges or landscaping; in others, it is encouraged for all types of new construction. To successfully defend against claims arising from CSS and CSD, agency commitment to adhere to the strategies described in this digest is essential.

APPENDIX A—STUDY SURVEY

SURVEY
NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
PROJECT 20-6 STUDY TOPIC 17-02
TORT LIABILITY DEFENSE PRACTICES FOR DESIGN FLEXIBILITY

State transportation agencies have many funding requests and little funding. However, agencies still have the ability to provide quality projects to the public and be conscious of the public's concerns about safety, the environment and getting the most for their tax dollars. Some state agencies have adopted design policies that specifically require their staff to consider cost, scenic and historical factors when determining the appropriate scope and need of a new project. In order to accomplish this goal, designers are using innovative and creative approaches to solve design transportation problems.

NCHRP is preparing a report that will summarize state transportation agencies' experience with "practical design" and "context sensitive design" and provide legal counsel for those agencies with a framework for devising successful strategies to defend policy decisions made by engineering staff.

Some questions in this survey are most likely appropriate for the Division Director of Design (or your state's equivalent) to answer while some questions in the survey are directed to your legal counsel. Please visit the report website at Tparkerlaw.net if you wish to complete the survey electronically.

If sending your response by regular mail, please send to Terri Parker, Attorney at Law, 1922 N Twain, Nixa MO 65714. CDs or paper copies of materials are welcomed. You may also respond by e-mail and submit the requested information to Terri@tparkerlaw.net.

If you have any questions, please contact Ms. Parker at 417-839-5119 or at the above noted e-mail address.

Please provide the name and associated information of the person or persons completing this questionnaire and, if different, someone else that may be contacted for follow up information:

Name: _____
Title: _____
Agency: _____
Street Address: _____
City, State, Zip: _____
Telephone: _____
Fax Number and E-mail Address: _____

DESIGN QUESTIONS

1. Does your agency have a written policy requiring staff to consider and balance cost, environmental, scenic or historical significance when scoping and designing a project? If yes, please provide.
2. If the agency does not have a specific written policy, does staff nonetheless consider and balance factors such as cost, environmental, scenic and historical significance when scoping and designing a project? If yes, please explain.
3. Does the agency have a specific design exception policy and process? If yes please provide.
4. What documentation process is used by the agency for documenting decisions that do not comply with generally accepted guidelines such as the AASHTO Green Book, the Roadside Design Guide or internal policy?
5. What documentation is developed while the project is being scoped and designed? What forms used to work through the issues? How is the process memorialized? How is the information stored and for how long? Please provide examples of associated paperwork.
6. Please provide examples of instances where design decisions were made to achieve multiple public policy objectives, such as balancing cost and historical significance, or environmental and safety concerns.

LEGAL QUESTIONS

7. Has the agency used documentation gathered during the design process to later defend itself in court or against other legal challenges? If so what type of information was used and how was it used?

8. Was the department's defense successful? Please give a brief description of the case. What attorneys were involved? Please provide contact information if available.

9. Was the case reported anywhere? If so please provide citation.

10. Does your state have a statute that specifically allows or requires your design staff to consider factors such as cost, safety, historical or environmental significance? For example, Hawaii has a statute that specifically allows the agency to use "flexible design."

11. If you have a law that requires the balancing steps be taken, has it yet been challenged or reviewed by a court? If so what happened?

12. Does your state have a statute that provides design or discretionary immunity to the state agency or the individual employees of the agency? For instance, California has a law that provides an affirmative defense of compliance with standards or evidence of documented approval of a design exception based on sound engineering in a tort lawsuit. If so, please provide the citation. What experience have you had in defending this statute or discretionary decisions the agency has made?

APPENDIX B—SURVEY QUESTIONNAIRE

	Legal Question 1	**Legal Question 2**
State	Has the agency used documentation gathered during the design process to later defend itself in court or against other legal challenges? If so what type of information was used and how was it used?	Was the department's defense successful? Please give a brief description of the case. What attorneys were involved? Please provide contact information if available.
Alabama	Yes	Yes
Arkansas	No	N/A
California	Yes	Unknown
Colorado	No	N/A
Connecticut	No	N/A
Delaware	Yes	Yes
Florida	Yes	Yes
Georgia	Yes	N/A
Illinois	No	N/A
Iowa	Yes	Yes
Kansas	No	N/A
Kentucky	No response	No response
Maryland	Yes	Yes
Massachusetts	Yes	Yes
Mississippi	No	N/A
Missouri	No	N/A
Nebraska	No	N/A
New York	Yes	Yes
Ohio	Yes	Yes
Oregon	N/A	N/A
Pennsylvania	Yes	Yes
Tennessee	Yes	Yes
Texas	Unknown	Unknown
Utah	No	No
Vermont	Yes	Yes
Virginia	No	N/A
Washington	Yes	Yes
Wyoming	Yes	N/A

	Legal Question 3	**Legal Question 4**
State	Was the case reported anywhere? If so please provide citation.	Does your state have a statute that specifically allows or requires your design staff to consider factors such as cost, safety, historical or environmental significance? For example, Hawaii has a statute that specifically allows the agency to use "flexible design."
Alabama	Yes	No
Arkansas	N/A	No
California	Unknown	Yes
Colorado	No	No
Connecticut	N/A	Yes
Delaware	N/A	Yes
Florida	Yes	Yes
Georgia	N/A	N/A
Illinios	N/A	Yes
Iowa	Yes	No
Kansas	N/A	Yes
Kentucky	No response	No response
Maryland	N/A	Yes
Massachusetts	N/A	No
Mississippi	N/A	No
Missouri	N/A	No
Nebraska	N/A	Yes
New York	Yes	No
Ohio	N/A	No
Oregon	N/A	Yes
Pennsylvania	Yes	No
Tennessee	Unknown	No
Texas	N/A	No
Utah	N/A	No
Vermont	Unknown	No
Virginia	N/A	No
Washington	Unknown	Yes
Wyoming	N/A	N/A

	Legal Question 5	Legal Question 6
State	If you have a law that requires the balancing steps be taken, has it yet been challenged or reviewed by a court? If so what happened?	Does your state have a statute that provides design or discretionary immunity to the state agency or the individual employees of the agency? For instance, California has a law that provides an affirmative defense of compliance with standards or evidence of documented approval of a design exception based on sound engineering in a tort lawsuit. If so, please provide the citation. What experience have you had in defending this statute or discretionary decisions the agency has made?
Alabama	N/A	Yes
Arkansas	N/A	No
California	Unknown	Yes
Colorado	No	Yes
Connecticut	No	No
Delaware	N/A	Yes
Florida	No	Yes
Georgia	N/A	N/A
Illinois	No	Yes
Iowa	N/A	Yes
Kansas	Unknown	Unknown
Kentucky	No response	No response
Maryland	N/A	Yes
Massachusetts	No	Yes
Mississippi	No	Yes
Missouri	N/A	Yes
Nebraska	N/A	Yes
New York	No	Unknown
Ohio	N/A	No
Oregon	N/A	Unknown
Pennsylvania	Yes	No
Tennessee	N/A	No
Texas	N/A	Yes
Utah	N/A	Yes
Vermont	N/A	Yes
Virginia	N/A	
Washington	N/A	No
Wyoming	N/A	Yes

State	Design Question 1 Does your agency have a written policy requiring staff to consider and balance cost, environmental, scenic or historical significance when scoping and designing a project? If yes, please provide.	Design Question 2 If the agency does not have a specific written policy, does staff nonetheless consider and balance factors such as cost, environmental, scenic and historical significance when scoping and designing a project? If yes, please explain.
Alabama	No	Yes
Arkansas	No	Yes
California	Yes	N/A
Colorado	Yes	N/A
Connecticut	No	Yes
Delaware	Yes	N/A
Florida	Yes	N/A
Georgia	Yes	N/A
Illinios	Yes	N/A
Iowa	No	Yes
Kansas	Yes	Yes
Kentucky	No response	No response
Maryland	Yes	N/A
Massachusetts	Yes	N/A
Mississippi	Yes	N/A
Missouri	Yes	N/A
Nebraska	No	Yes
New York	Yes	N/A
Ohio	No	Yes
Oregon	Yes	N/A
Pennsylvania	Yes	N/A
Tennessee	No	Yes
Texas	Yes	No
Utah	Yes	Yes
Vermont	Yes	N/A
Virginia	Yes	N/A
Washington	Yes	N/A
Wyoming	No	Yes

	Design Question 3	**Design Question 4**
State	Does the agency have a specific design exception policy and process? If yes please provide.	What documentation process is used by the agency for documenting decisions that do not comply with generally accepted guidelines such as the AASHTO Green Book, the Roadside Design Guide or internal policy?
Alabama	Yes	Attached
Arkansas	Yes	Attached
California	Yes	Attached
Colorado	Yes	Attached
Connecticut	Yes	Attached
Delaware	Yes	Attached
Florida	Yes	Attached
Georgia	Yes	Attached
Illinois	Yes	Attached
Iowa	Yes	Attached
Kansas	Yes	Attached
Kentucky	No response	No response
Maryland	Yes	Attached
Massachusetts	Yes	Attached
Mississippi	Yes	Attached
Missouri	Yes	Attached
Nebraska	Yes	Attached
New York	Yes	Attached
Ohio	Yes	Attached
Oregon	Yes	Attached
Pennsylvania	Yes	Attached
Tennessee	Yes	Attached
Texas	Yes	Attached
Utah	Yes	Attached
Vermont	Yes	Not provided
Virginia	Yes	Attached
Washington	Yes	Attached
Wyoming	Yes	Attached

	Design Question 5	**Design Question 6**
State	What documentation is developed while the project is being scoped and designed? What forms used to work through the issues? How is the process memorialized? How is the information stored and for how long? Please provide examples of associated paperwork.	Please provide examples of instances where design decisions were made to achieve multiple public policy objectives, such as balancing cost and historical significance, or environmental and safety concerns.
Alabama	Attached	Attached
Arkansas	Attached	No
California	Attached	Attached
Colorado	Attached	Attached
Connecticut	Attached	Attached
Delaware	Attached	Attached
Florida	Attached	Attached
Georgia	Attached	Attached
Illinois	Attached	Attached
Iowa	Attached	Unknown
Kansas	Unknown	Unknown
Kentucky	No response	No response
Maryland	Attached	Not provided
Massachusetts	Attached	Attached
Mississippi	Attached	Attached
Missouri	Attached	Attached
Nebraska	Attached	Attached
New York	Attached	Attached
Ohio	Attached	Attached
Oregon	Attached	Attached
Pennsylvania	Attached	Attached
Tennessee	Attached	Attached
Texas	Attached	Not provided
Utah	Attached	Attached
Vermont	Attahed	Not provided
Virginia	Attached	N/A
Washington	Attached	Attached
Wyoming	Attached	Attached

APPENDIX C—STATUTES DISCUSSING CONTEXT SENSITIVE OR PRACTICAL DESIGN CONCEPTS

California	Cal. Sts. & High. Code Section 121. Notwithstanding any other provision of law, a state highway that has been designated by the federal government as an All-American Road on or before April 30, 2002, shall be maintained and operated by the department consistent with the recommendations for context-sensitive design standards relative to aesthetics and safety that are contained in the corridor management plan submitted to the Federal Highway Administration.
Connecticut	Conn. Gen. Stat. Section 13a-86a. (a) In the event site conditions, environmental factors, engineering factors or considerations of community standards and custom would reasonably allow for a departure from the standards for geometric design with respect to bridges established by the American Association of State Highway and Transportation Officials or by the Department of Transportation, the department may approve exceptions to such standards without waivers. (b) In choosing between the rehabilitation of an existing bridge and the construction of a new bridge, whether on the existing location or on a new location, the department and any affected municipality shall weigh the following factors: (1) The functional classification of the highway; (2) the load capacity and geometric constraints of the bridge within its existing footprint and the availability of alternative routes; (3) the comparative long-term costs, risks and benefits of rehabilitation and new construction; (4) the requirements of state standards for geometric design; (5) disruption to homes and businesses; (6) environmental impacts; (7) the potential effects on the local and state economies; (8) cost-effectiveness; (9) mobility; (10) safety, as determined by factors such as accident history for motorists, pedestrians and bicyclists; and (11) the impact on the historic, scenic and aesthetic values of the municipality in which the bridge is or may be located. (c) The department shall implement policies and programs to allow municipal governments to develop projects or construct projects, or both, in consultation with the department, in accordance with federal laws and regulations if federal funds are used. (d) The state or a municipality, any state or municipal agency or any employee thereof or any engineer retained in connection with a bridge project shall not be liable for any injury or damage to any person or property caused by the selection of design standards that enable an existing bridge, which was initially constructed not less than twenty-five years prior to October 1, 1997, to be repaired or rehabilitated in substantially the same configuration that existed before such repair or rehabilitation, provided nothing in this subsection shall be construed to relieve the state, any municipality or any person from liability under section 13a-144 or 13a-149 arising out of structural or design defects in any such bridge or negligence in the maintenance, repair or rehabilitation of any such bridge.
Delaware	Del. Code Section 211, Planting standards. (a) All landscaping and planting activities undertaken as part of the Department of Transportation's obligation to mitigate the removal, cutting or clearing of landscape improvements pursuant to this part must be conducted pursuant to a landscape plan prepared by the Delaware licensed and registered landscape design professional or by the Delaware Department of Transportation, and must be conducted:

	(1) To promote transplant survival; (2) In compliance with federal law and regulation; (3) In compliance with any Department of Transportation design specifications relating to obstructions in the right-of-way, and the distance that landscape improvements must be planted from the travel lanes of the roadway for safety purposes and corresponding to any policies related to context sensitive design.
Florida	Fla. Stat. Section 336.045, Uniform minimum standards for design, construction, and maintenance; advisory committees. (1) The department shall develop and adopt uniform minimum standards and criteria for the design, construction, and maintenance of all public streets, roads, highways, bridges, sidewalks, curbs and curb ramps, crosswalks, where feasible, bicycle ways, underpasses, and overpasses used by the public for vehicular and pedestrian traffic. In developing such standards and criteria, the department shall consider design approaches which provide for the compatibility of such facilities with the surrounding natural or manmade environment; the safety and security of public spaces; and the appropriate aesthetics based upon scale, color, architectural style, materials used to construct the facilities, and the landscape design and landscape materials around the facilities. The department shall annually provide funds in its tentative work program to implement the provisions of this subsection relating to aesthetic design standards.
Hawaii	Haw. Rev. Stat. Section 264-20, Flexibility in highway design; liability of State, counties, and public utilities. (a) If a highway, including any bridge, principal and minor arterial road, collector and local road, or street, requires new construction, reconstruction, preservation, resurfacing (except for maintenance surfacing), restoration, or rehabilitation, the department of transportation with regard to a state highway, or a county with regard to a county highway, may select or apply flexible highway design guidelines consistent with practices used by the Federal Highway Administration and the American Association of State Highway and Transportation Officials. Flexibility in highway design shall consider, among other factors: (1) Safety, durability, and economy of maintenance; (2) The constructed and natural environment of the area; (3) Community development plans and relevant county ordinances; (4) Sites listed on the State or National Register of Historic Places; (5) The environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity; (6) Access for other modes of transportation, including but not limited to bicycle and pedestrian transportation; (7) Access to and integration of sites deemed culturally and historically significant to the communities affected; (8) Acceptable engineering practices and standards; and (9) Safety studies and other pertinent research. (b) Any other law to the contrary notwithstanding, any decision by the State, the department of transportation, a county, or any officers, employees, or agents of the State, the department of transportation, or a county to select or apply flexibility in highway design pursuant to this section and consistent with the practices used by the Federal Highway Administration and the

	American Association of State Highway and Transportation Officials shall not give rise to a cause of action or claim against: (1) The State; (2) The department of transportation; (3) The counties; (4) Any public utility regulated under chapter 269 that places its facilities within the highway right-of-way; or (5) Any officer, employee, or agent of an entity listed in paragraphs (1) to (4). (c) The exception to liability provided in subsection (b) applies only to the decision to select or apply flexibility in highway design pursuant to this section and does not extend to design, construction, repair, correction, or maintenance inconsistent with subsection (a).
Illinois	Ill. Comp. Stat. Section 4-219, Context sensitivity. Context sensitivity. (a) It is the intent of the General Assembly to ensure that Department of Transportation projects adequately meet the State's transportation needs, exist in harmony with their surroundings, and add lasting value to the communities they serve. (b) To support this objective, the Department of Transportation shall embrace principles of context sensitive design and context sensitive solutions in its policies and procedures for the planning, design construction, and operation of its projects for new construction, reconstruction, or major expansion of existing transportation facilities. (c) A hallmark of context sensitive design and context sensitive solutions principles for the Department of Transportation shall be early and ongoing collaboration with affected citizens, elected officials, interest groups, and other stakeholders to ensure that the values and needs of the affected communities are identified and carefully considered in the development of transportation projects. (d) Context sensitive design and context sensitive solutions principles shall promote the exploration of innovative solutions, commensurate with the scope of each project, that can effectively balance safety, mobility, community, and environmental objectives in a manner that will enhance the relationship of the transportation facility with its setting. (e) The Department shall report to the Governor and the General Assembly no later than April 1, 2004 on its efforts to implement context sensitive design criteria.
Kansas	Kan. Stat. Ann. 68-2314b(b). The department of transportation shall develop criteria for the incorporation of practical improvements into design of the projects specified in this subsection.
Maine	Me. Rev. Stat. 23-73, Transportation Policy. 3. Transportation policy. It is the policy of the State that transportation planning decisions, capital investment decisions and project decisions must: A. Minimize the harmful effects of transportation on public health and on air and water quality, land use and other natural resources; B. Require that the full range of reasonable transportation alternatives be evaluated for all significant highway construction or reconstruction projects and give preference to transportation system management options, demand management strategies, improvements to the existing system, and other transportation modes before increasing highway capacity through road building activities;

	C. Ensure the repair and necessary improvement of roads and bridges throughout the State to provide a safe, efficient and adequate transportation network; D. Reduce the State's reliance on foreign oil and promote reliance on energy-efficient forms of transportation; E. Meet the diverse transportation needs of the people of the State, including rural and urban populations and the unique mobility needs of the elderly and disabled; F. Be consistent with the purposes, goals and policies of the Comprehensive Planning and Land Use Regulation Act; G. Incorporate a public participation process in which local governmental bodies and the public have timely notice and opportunity to identify and comment on concerns related to transportation planning decisions, capital investment decisions and project decisions. The department and the Maine Turnpike Authority shall take the comments and concerns of local citizens into account and must be responsive to them.
Michigan	Mich. Comp. Laws 247.660p. Definitions; complete streets policy; duties of state transportation commission; consultation by department or county road agency with municipality; agreements for maintenance of transportation facilities; complete streets advisory council; creation; membership; appointment; terms; vacancy; removal; meetings; election of officers; quorum; voting; business conducted at public meeting; writings; compensation; duties of advisory council. (1) As used in this section: (a) "Complete streets" means roadways planned, designed, and constructed to provide appropriate access to all legal users in a manner that promotes safe and efficient movement of people and goods whether by car, truck, transit, assistive device, foot, or bicycle. (b) "Complete streets policy" means a document that provides guidance for the planning, design, and construction of roadways or an interconnected network of transportation facilities being constructed or reconstructed and designated for a transportation purpose that promotes complete streets and meets all of the following requirements: (i) Is sensitive to the local context and recognizes that needs vary according to urban, suburban, and rural settings. (ii) Considers the functional class of the roadway and project costs and allows for appropriate exemptions. (iii) Considers the varying mobility needs of all legal users of the roadway, of all ages and abilities. (c) "Department" means the state transportation department.
Minnesota	Minn. Stat. Ann. Subd. 5. Variances from engineering standards. (a) When evaluating a request for a variance from the engineering standards for state-aid projects under chapter 162 in which the variance request is related to complete streets, the commissioner shall consider the latest edition of: (1) A Policy on Geometric Design of Highways and Streets, from the American Association of State Highway and Transportation Officials; and (2) for projects in urban areas, the Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, from the Institute of Transportation Engineers.

	(b) If the commissioner denies a variance request related to complete streets, the commissioner shall provide written reasons for the denial to the political subdivision that submitted the request.
New Jersey	N.J. Stat. Ann. 27:1B-21.19, Context sensitive design. 6. Many State highways run through fully developed cities and suburban towns. In addition, many small villages in rural areas have State highways which pass through built-up residential areas or village centers. The traffic on many of these State highways, particularly large truck and speeding traffic, prevents these residential areas, town centers and future town centers from functioning as intended. The commissioner shall study this issue and develop a departmental program which authorizes context sensitive design and examines the functional classifications of State highways running through developed cities and suburban towns. As used in this section, "context sensitive design" means a planning technique that embraces a collaborative, interdisciplinary process and recognizes the uniqueness of the community in planning transportation projects.
Oregon	Or. Rev. Stat. Section 383.001, Findings. The Legislative Assembly finds that: (1) The development, improvement, expansion and maintenance of an efficient, safe and well-maintained system of roads, highways and other transportation facilities is essential to the economic well-being and high quality of life of the people of this state. (2) Public sources of revenues, including federal funding, to provide an efficient transportation system have not kept pace with the state's growing population and growing transportation needs, and all available alternative sources of funding should be utilized to supplement available public sources of revenues. (3) Because public funding sources are not providing the state with sufficient funds to meet all of its transportation needs, private funding should be encouraged as an additional source of funding for transportation projects and facilities. (4) Various alternatives for utilizing the funds of private entities in the acquisition, design, construction, reconstruction, operation and maintenance of transportation facilities exist, including arrangements whereby private entities obtain exclusive agreements to design, build, own, lease or operate with private funds all or a portion of transportation projects and facilities in exchange for the right to receive certain revenues generated from the operation and utilization of such transportation projects and facilities. (5) Another important alternative for the funding of transportation facilities is the use of federal funds pursuant to 23 U.S.C. 129(a), as amended by section 112 of the Intermodal Surface Transportation Efficiency Act of 1991, which established a program authorizing federal participation in construction of publicly or privately owned toll highways, bridges and tunnels. (6) The federal legislation allows for a mix of federal funding and private funding of transportation facilities, allowing the states to leverage available federal funds as a means for attracting private capital. (7) Legislation for the utilization of private funding of transportation facilities should be flexible enough to permit the Department of Transportation to obtain the advantages of any available alternative under which the acquisition, design, construction, reconstruction, operation, maintenance and repair of transportation facilities can be financed in whole or in part or in combination by any available sources of private or public funding.

Vermont	Vt. Stat. Tit. 19, Sec. 10c, Statement of policy; highways and bridges. (a) For projects that are on the National Highway System, if site conditions, environmental factors or engineering factors restrict the use of national standards for geometric design, the agency may pursue exceptions to those standards when appropriate to comply with local or regional plans as interpreted by the adopting entities, or with federal or state long-range plans as adopted, or with local conditions. (b) For projects that are not on the National Highway System, the agency shall develop and implement state standards for geometric design. Design speeds may be lower than legal speeds. Design speeds lower than legal speeds may be used without the requirement of a formal design exception, provided appropriate warnings are posted. (c) In choosing between the improvement of an existing highway and complete reconstruction, the agency shall weigh the following factors: (1) disruption to homes and businesses; (2) environmental impacts; (3) the benefits attainable by designing and constructing the improvement as a limited access facility; (4) the potential effects on the local and state economies; (5) cost-effectiveness; (6) mobility; (7) safety, as determined by factors such as accident history for motorists, pedestrians and bicyclists; (8) local or regional plans as interpreted by the adopting entity, and state agency plans; (9) the impact on the historic, scenic and aesthetic values of the municipality, as interpreted by the municipality, in which the highway is located; and (10) if it is a forest highway under federal jurisdiction. (d) It shall be the policy of the state in developing projects as defined in subsection (b) of this section for the resurfacing, restoration, rehabilitation and reconstruction of bridges and the approaches to bridges to favor their preservation within their existing footprints, in order to ensure compatibility with the Vermont setting and context and to reduce costs and environmental impacts. (e) The agency shall investigate and implement, where feasible, policies and programs to allow municipal governments to develop projects or construct projects, or both, under the agency's oversight in accordance with federal laws and regulations if federal funds are used.
Washington	Wash. Rev. Code 47.01.078, Transportation system policy goals—Duties. To support achievement of the policy goals described in RCW 47.04.280, the department shall: (1) Maintain an inventory of the condition of structures and corridors in most urgent need of retrofit or rehabilitation; (2) Develop long-term financing tools that reliably provide ongoing maintenance and preservation of the transportation infrastructure; (3) Balance system safety and convenience through all phases of a project to accommodate all users of the transportation system to safely, reliably, and efficiently provide mobility to people and goods;

	(4) Develop strategies to gradually reduce the per capita vehicle miles traveled based on consideration of a range of reduction methods; (5) Consider efficiency tools, including high occupancy vehicle and high occupancy toll lanes, corridor-specific and systemwide pricing strategies, active traffic management, commute trip reduction, and other demand management tools; (6) Promote integrated multimodal planning; and (7) Consider engineers and architects to design environmentally sustainable, context-sensitive transportation systems.

APPENDIX D

Iowa Department of Transportation
Office of Design

1C-1

Selecting Design Criteria

Design Manual
Chapter 1
General Information
Originally Issued: 12-31-97
Revised: 04-29-11

Initial Design Criteria

The design criteria should be established prior to beginning a project. Although specific criteria should be developed for each project, the tables linked from this section contain criteria reflecting the best practices for most projects. These best practices are based upon:

- Requirements defined in the federal law governing highway design can be found in 23 CFR Sec 625.4. These requirements are generally highlighted in yellow in the criteria tables.
- Requirements defined in other state or federal laws
- Guidance provided in AASHTO documents
- Research findings
- Provisions from the 3R Agreement with FHWA
- Departmental decisions to balance initial costs, maintenance costs, mobility, safety and other concerns

Quick Tips:

Complete a Project Design Criteria Worksheet for each project or corridor. Submit it to the Office Director or ADE responsible for the design for approval.

Refer to Section 1C-8 for information on documenting design decisions.

For design decisions exceeding the design criteria, see Section 1B-7.

Project Design Criteria

For each project, complete a Project Design Criteria Worksheet and submit it to the Office Director or ADE responsible for the design of the project.

The designer should begin with the initial criteria shown in the tables, but may need to modify them due to project constraints. The project design criteria should be agreed upon at a PMT meeting. If a value is chosen that is not within the preferred values in the tables, the decision should be approved and documented. Refer to Section 1C-8, Documenting Design Decisions.

The designer may choose to use more conservative values than those listed in the tables. However, if project costs increase due to those decisions, the Office Director or ADE should approve the decision (see Section 1B-7).

Initial Design Criteria Tables

Reconstruction - includes overlays adding more than 4" of pavement structure, inlays, new construction, and conversion of two lane to four lane, or any project on the Interstate.

Project Design Criteria Worksheet

Design Criteria Tables:

Preferred Values Acceptable Values (See Section 1C-8 for documentation requirements.)

3R - includes overlays adding 4" or less of pavement structure (not on the Interstate system). The 3R Agreement outlines allowable exceptions to the reconstruction design criteria. Contact the Methods Section for a copy of the current 3R Agreement.

3R Project Design Criteria Worksheet

Working within Constraints

To meet the constraints of a project, a roadway element may need to be designed using values below the initial design criteria. A case such as this requires judgment and serious consideration of many factors:

- The type of project (i.e., new construction, reconstruction, or 3R).
- The functional classification of the road, the amount and character of the traffic, and the crash history of the road. A crash analysis should be performed.
- The degree of variance from minimum or maximum values and whether the values are within AASHTO guidelines.
- The effect the variance has on the safety and operation of the facility, and its compatibility with adjacent sections of the roadway.
- How the feature will affect other criteria.
- The introduction of mitigating features (e.g. pavement markings, signing, delineation, or rumble strips).
- The impact of the full variance on scenic, historic, or other environmental features.

During the concept field review record existing features, such as foreslopes, provided clear zone distance, shoulder cross-slopes, and shoulder widths to aid in the selection of an appropriate design concept. Having a record of the features is important since meeting the initial design criteria for one feature may require significant improvements to other features. Understanding how all the features affect each other will help to avoid designing projects that can escalate beyond their initial scope, both in cost and in type of work. Consider all design options and select the best overall design that will balance safety and funding.

Safety repairs should be addressed whenever possible. Expecting safety repairs to be included in future resurfacing projects can lead to a steady degrading of the highway system as repairs are continually delayed. Because funds are limited, targeting funds towards projects that will provide the best value is very important. Funding spent completing repairs that provide marginal safety benefits in one area may be better spent repairing more pressing safety issues in other areas.

Mitigation Strategies

If a project cannot be designed to meet the full values recommended in this section, consider how mitigation strategies may help to reduce operational or safety problems. A list of possible mitigation strategies is included in Chapter 4 of Mitigation Strategies for Design Exceptions at http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/index.htm

APPENDIX E

Iowa Department of Transportation
Office of Design

1C-8

Documenting Design Decisions

Design Manual
Chapter 1
General Information
Originally Issued: 12-22-09
Revised: 08-31-10

For each project, include the Project Design Criteria worksheet (Section 1C-1) in the project file, as well as the written documentation defined below.

Variance from the Department's Guidelines

Each of the criteria tables lists the desired values selected by the Department. The Office Director responsible for the plan development (Assistant District Engineer for district design projects) may approve variances from the Design Manual provided they are appropriate and meet the documentation requirements. For these situations, the designer should send an email to the Office Director explaining the variance and why it is necessary. These issues should also be discussed at a PMT meeting prior to submitting the email.

Variance from controlling FHWA Standards

On NHS projects, federal law requires formal design exceptions when certain design guidelines are not met. These design guidelines are listed in the Code of Federal Regulations (23 CFR Sec 625.4). These values are highlighted in yellow on the tables in Section 1C-1. The key documents impacting design of "Roadway and Appurtenances" are:

Quick Tips:

Refer to the tables in Section 1C-1

- Approval of the Office Director (ADE for district projects) is required for any features not meeting the desirable values listed on these tables. Preferably, a written record of this approval is maintained for project records.
- For projects on NHS routes, a formal design exception will be required on features below those highlighted in yellow.
- Design exceptions require signatures of the Office Director, District Engineer, Director of the Office of Design and, for FHWA oversight projects only, the FHWA Division Administrator.

- A Policy on Design Standards Interstate System.
- 3R Agreement.
- A Policy on Geometric Design of Highways and Streets. Because this manual covers so many aspects of roadway design, FHWA distributed a memo limiting design exception requirements to the following 13 controlling criteria.

1. Design Speed
2. Grade
3. Lane width
4. Stopping sight distance
5. Shoulder width
6. Cross slope
7. Bridge width
8. Superelevation
9. Structural capacity
10. Vertical clearance
11. Horizontal alignment
12. Vertical alignment
13. Horizontal clearance (not including clear zone)

- Erosion and Sediment Control on Highway Construction Projects (23 CFR 650, subpart B).
- Location and Hydraulic Design of Encroachments on Flood Plains (23 CFR 650, subpart A).
- Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772).
- Accommodation of Utilities (23 CFR 645, subpart B).
- Pavement Design (23 CFR 626).

Note: Formal design exceptions are only required on NHS routes.
On other routes following the VARIANCE FROM DEPARTMENT'S GUIDELINES.

The key documents impacting design of "Bridges and Structures" are:

- Standard Specifications for Highway Bridges, AASHTO.
- AASHTO LRFD Bridge Design Specifications, AASHTO.
- Standard Specifications for Movable Highway Bridges, AASHTO.
- Bridge Welding Code, ANSI/AASHTO/AWS D1.5, AASHTO.
- Structural Welding Code--Reinforcing Steel, ANSI/AWS D1.4.
- AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, AASHTO.
- Navigational Clearances for Bridges, refer to 23 CFR part 650, subpart H.

Writing Design Exceptions

Include the following information when writing a design exception.

Project Information

Include a brief description of the project. Identify the route, location, functional classification, current and design year ADT, percent trucks, and all other basic project information that is relevant for evaluating the design exception. Note that the design meets minimums and maximums for the type of project and for this classification of highway, except as noted. Clearly explain why the design exception is necessary.

Identification of the Design Exception

Identify and describe the design element(s) that do not meet the recommended design criteria. State what the minimum or maximum value is and the resource from which that information was obtained. Include the specific location(s), limits, or length of the alternate design element. If it will help the reviewer better understand the design exception, a profile view, a drawing, an aerial photo, or similar information may be included in the design exception.

Supporting Information

Include information that supports the decision to make a design exception. This may include cost information, crash data analysis, a benefit/cost analysis, or a discussion of consequences associated with bringing the design up to the recommended design criteria.

Generally, a crash data analysis is performed to determine the impact of the design elements on safety. Usually the latest 5 years of available crash data are evaluated. During the evaluation, look beyond the numbers and, at a minimum, examine the specific types of crashes (run-off-the road, rear-end, sideswipe, head-on, etc.). Examine what affect the design exception may have on specific types of crashes. Crashes that would not have been impacted by the proposed improvement may be eliminated from the analysis. For example if you are reviewing crash data for an area that would require foreslope flattening, you may want to eliminate any crashes that aren't directly related to the steep foreslopes. Animal in the roadway crashes are commonly eliminated from analysis. If crash data is not available, examine data from routes with similar features.
A cost analysis can be performed to determine the costs required to achieve the suggested minimums or maximums. Use the total project cost. Additional costs could include items such as additional grading or paving, updating or replacing structures, acquiring additional right of way, wetland mitigation, etc. An updated Summary of Costs per mile of Road Construction can be obtained from the Pre-Design Section to assist with the cost analysis.

Once the crash data and the correction costs have been compiled, a benefit to cost (B/C) analysis can be performed. This involves comparing the safety benefit of correcting the deficiency to the cost of the corrections. A spreadsheet has been developed to determine the benefit to cost ratio and can be obtained from the Methods Section. The updated loss reduction values for spot locations and rural sections used in the B\C analysis can be obtained from the Traffic and Safety Internet page at http://www.iowadot.gov/tsip.htm. If different types of alternate design elements have been identified on a project, a separate B/C analysis should be developed for each. An example B/C analysis is included at the end of this section.

Mitigating Measures

Discuss practical alternatives (e.g. delineation, milled rumble strips, signing, lighting) along with associated costs. Consider these alternatives prior to requesting an exception. If none of the alternatives are chosen, provide sufficient information on costs versus benefits, right of way and environmental impacts, and any other factors to explain why. Describe any measures that were considered for mitigating the potential adverse impacts of the design exception. Identify any mitigating measures that will be taken.

A list of possible mitigation strategies is included in Chapter 4 of Mitigation Strategies for Design Exceptions at http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/index.htm

Conclusion/Recommendation

Clearly state a recommendation.

Signature Lines

Include signature and datelines for all those required to approve the design exception. All projects will require approval of the office director of the office completing the design, the District Engineer, and the Director of the Office of Design. For projects with FHWA oversight and any project on an Interstate route, approval from the FHWA Division Administrator is also required.

Submitting a Design Exception

Submit design exceptions for approval as early as possible in the design process—first to the District Engineer, then to the Director of the office responsible for the design, the Director of the Office of Design, and lastly to FHWA if required. Thoroughly document design exceptions and include in the project file.

Design Exception Examples

Example 1: Design Exception for Corridor Improvements

Example 2: Design Exception for Reduced Shoulder Widths

APPENDIX F

DelDOT Road Design Manual

3.1.3 DEPARTURE FROM STANDARDS

Most projects are expected to meet at least the minimum standard design values established for the project level. Occasionally there may be conditions that warrant consideration of a lower value. For projects on higher functional classification roadways, it is more critical to strive to meet or exceed all of the applicable standards, primarily because the motorist expects a higher standard and will drive the facility accordingly.

The need for exceptions to the standards must be identified early in the project development phase in order that approvals or denials will not delay completion of the design or require extensive redesign. However, the need to evaluate a lower design value may arise at any time during the design process and needs to be addressed expeditiously. Thorough documentation is essential. The need for exceptions should not be viewed as normal or routine. The forms in this chapter shall be used to document decisions on design criteria and as a basis for developing and documenting requests for exceptions. The primary focus of the request should be highway safety. The design and proposed mitigation should be the best practical alternative that considers whether or not other controlling design elements will be adversely affected.

The major controlling design elements that need to be evaluated for conformity to established standards include:

- Design speed;
- Through lane and auxiliary lane widths;
- Shoulder widths;
- Stopping sight distance on vertical and horizontal curves;
- Horizontal alignment (radius of curve);
- Vertical alignment;
- Minimum and maximum grades;
- Cross slopes;
- Superelevation rate;
- Horizontal clearance;
- Vertical clearance;
- Bridge width; and
- Structural capacity.

An exception for design speed should not be sought as this element establishes most if not all of the other parameters to be met. As discussed in this chapter and in several other sections in this manual, design speed is an achievable speed selected by the designer based on the various factors the designer must consider. Design elements that cannot be met within that selected design speed should be supported by seeking a design exception in accordance with the following guidelines.

All variances from standards need to be documented in the project files, and, in many cases, require approval from the Chief Engineer and FHWA. The level of documentation depends on the project scope, functional classification and other factors. Depending upon the significance of the request, the support information may include some or all of the following:

- Existing roadway characteristics,
- Required and proposed design criteria;
- Cross section or geometric figures comparing the existing and proposed conditions;
- Supporting calculations and cost analysis;
- Analysis of accident records;
- A discussion on the compatibility with adjacent sections;
- Effect on right-of-way;
- Environmental constraints;
- Any proposed mitigation considered to help offset the variance from the design standard;
- Mitigation costs;
- Public support or opposition; and
- Other pertinent factors

There are several project types described in the following sections. Figure 3-2 shows the types of construction that fall under each project type. The type of construction shall be shown on the title sheet of the construction plans.

Figure 3-2
Types of Construction

Project Type	Type of Construction
New Construction and Reconstruction	Bridge Replacement
	New Construction (Road/Bridge)
	4-R
Intermediate	Bridge Rehabilitation
	Bridge Superstructure Replacement
	Intersection Improvements
	Safety Improvements
	Traffic Calming
Preventive Maintenance	Bridge Painting
	Bridge Preservation
	Bridge Preventive Maintenance
	Community Transportation Fund
	Pavement Preservation
	Scour Countermeasures
Miscellaneous Improvement	Advanced Utility
	Bike and Pedestrian Improvements
	Drainage Improvements
	ITS
	Landscaping
	Lighting
	Railroad Crossing
	Signal
	Signing and Striping
	Small Structure Repair
	Transportation Enhancement
	Miscellaneous Improvements (e.g., Wetland Mitigation, DTC Rail, Facilities)

3.1.3.1 NEW CONSTRUCTION AND RECONSTRUCTION PROJECTS

New construction and reconstruction projects on the interstate system and the NHS are expected to be in conformance with the appropriate standards and exceptions should be rare. All projects on the NHS (except preventive maintenance) shall conform to the standards in the current edition of AASHTO's *A Policy on Geometric Design of Highways and Streets* (the Green Book). All projects on the interstate system (except preventive maintenance) shall also meet the design criteria contained in the current edition of *A Policy on Design Standards—Interstate System.* Projects having full federal oversight by FHWA are established in the current *Stewardship and Oversight Agreement* between FHWA and DelDOT. FHWA must approve all design exceptions for projects with full federal oversight.

New construction and reconstruction projects require a formal design exception as described in "Required Design Exception Documentation" (Figure 3-3) to justify the rationale for departure from the established design standards. The Chief Engineer must approve design exceptions for all new construction and reconstruction projects. "Design Exception Request" (Figure 3-4) is a guide format for developing a design exception request. It is important that the designer complete the "Design Control Checklist" (Figure 3-5) and the "Design Criteria Form" (Figure 3-6) for all new construction and reconstruction projects.

Figure 3-3
Required Design Exception Documentation

Project Type	Design Exception Request Fig. 3-4)	Design Control Checklist Fig. 3-5)	Design Criteria Form Fig. 3-6)	Asst. Director, Design, and Chief Engineer Approval	FHWA Approval
New Construction or Reconstruction – Full Federal Oversight	X	X	X	X	X
New Construction or Reconstruction – State Administered	X	X	X	X	
Intermediate Level		X	X		
Preventive Maintenance		X			
Miscellaneous Improvement		X			

3.1.3.2 INTERMEDIATE PROJECTS

The scope of intermediate projects is improvements being retrofitted into the existing infrastructure. At times, it may be necessary to deviate from the design standards. It is important that the designer complete the "Design Control Checklist" (Figure 3-5) and the "Design Criteria Form" (Figure 3-6) for all intermediate projects. If design standards cannot be met due to site conditions, then it shall be noted on the Design Criteria Form. In addition, there must be a memo to the project file explaining the justification for the variances in the design standards signed by the Project Engineer, the Group Engineer and the Assistant Director. The level of documentation can vary depending on the project intent, environmental concerns and other issues. In most cases it is not necessary to provide the same level of documentation as provided in a formal design exception request because the project's scope has already been established. The following are examples of intermediate projects:

- Safety improvement projects
- Addition of channelizing islands with no reduction in existing lane or shoulder width
- Intersection improvements with no reduction in existing lane or shoulder width
- Minor lane or shoulder widening
- Traffic calming features, e.g. speed humps, chicanes, midblock median islands, chokers, or narrowed lanes. (Consult with FHWA for projects on NHS Routes.)
- Superstructure replacement
- Bridge rehabilitation

3.1.3.3 PREVENTIVE MAINTENANCE PROJECTS

Preventive maintenance includes rehabilitation or restoration of specific elements of a highway facility when such activities are a cost- effective means of extending the pavement or bridge life and shall not degrade any existing or geometric aspects of the facility. The majority of the work for these projects is between existing curb lines or outer edges of existing shoulders. These types of projects are not required to provide any documentation for design standards that cannot be met. A general list of preventative maintenance items is below:

- Pavement Preservation - Pavement milling and resurfacing of the same thickness with no reduction in lane widths, or pavement repair (e.g. sawing, sealing, pothole patching)
- Bridge Preservation
    - Bridge painting
    - Bridge Preventive Maintenance
        - Deck rehabilitation
        - Joint replacement or repair
        - Bearing replacement
        - Pile Jackets
    - Scour countermeasures

- Seismic retrofit

3.1.3.4 MISCELLANEOUS IMPROVEMENT PROJECTS

These projects are typically beyond the existing edge of pavement and are intended to improve safety and aesthetics. They may also include improvements within the roadway intended to improve safety which do not degrade the existing highway geometrics. These projects are not required to provide any documentation for design standards that cannot be met. A general list of miscellaneous improvement project work items is below:

- New or replaced curb and/or sidewalk
- Modifying sidewalk to comply with ADA requirements
- Roadside safety enhancements
  - New guardrail installation
  - Guardrail repair/replacement
  - New impact attenuators
  - Impact attenuator repair or replacement
  - Upgrading bridge rails
  - Removal of obstructions
- Median barrier replacement
- Drainage improvements
- Signing
- Small Structure Repair
  - Culvert lining
  - Retaining structure repair
- Large ground-mounted signs
- New sign structures (sign bridge, cantilever and bridge-mounted, provided they meet clearance requirements)
- Existing sign structure rehabilitation
- Striping with no additional lanes nor reduction in existing lane width
- New or replaced raised pavement markers
- New or upgraded signals
- ITS (e.g. fiber optic cable, message signs, cameras, emergency call boxes)
- New or upgraded lighting systems
- Fencing, provided existing stopping sight distance is not degraded
- Glare screens, provided existing stopping sight distance is not degraded
- Repair of structural components resulting from traffic impact
- Advanced utility relocation projects
- Landscape improvements

Figure 3-4
Design Exception Request

State Project No._____**Federal-Aid Project No.**_____

Date: _____**Oversight Project: Yes** _____**No**____

Design Exception Abstract: (Provide a short summary detailing the nature of the exception, reasons for the request, etc.)

Note:
For all NHS projects, the thirteen controlling criteria to be met are design speed; through lane and auxiliary lane width; shoulder width; bridge width, structural capacity, horizontal alignment; vertical alignment; grades; stopping sight distance, cross-slope; superelevation; horizontal clearance; and vertical clearance.

RECOMMENDATION:

The purpose of this project is to----------.

The most effective method of addressing this is----------.

Based upon the conditions presented, it is recommended that a design exception be approved for the controlling substandard design element as justified.

Recommended By: _____
Squad Manager

Recommended By: _____
Group Engineer

Recommended By: _____
Assistant Director-Transportation Solutions

Recommended By: _____
Assistant Director-Design

Approved By: _____ **Date**: _____
Chief Engineer

Approved By: _____ **Date**: _____
Federal Highway Administration (NHS oversight projects only)

Enclosures: (Include design criteria, figures, calculations, etc. to document request.)

Figure 3-5
Design Control Checklist

PROJECT DATA

Squad Leader/Project Manager: _____

Project Title: _____

Contract No.: _____

Federal Aid Project No: _____

Project Limits: _____

Type of Construction: _____

Project Scope and Initial Estimate: _____

_____

_____

_____

DESIGN DATA

Functional Classification: _____ Directional Distribution (%): _____

Current AADT (Year) _____ Design Speed _____

Projected AADT (Year): _____ Design Vehicle _____

Projected DHV (Year): _____ Design Level of Service _____

% Trucks _____ Clear Zone _____

Recommended By: _____
Squad Manager

Recommended By: _____
Group Engineer

Recommended By: _____
Assistant Director-Transportation Solutions

Approved By: _____
Director-Transportation Solutions

Figure 3-6
Design Criteria Form

Design Criteria		
Design Factor	**As per Road Design Manual**	**Provided**
Design Speed*		
Width of Through Lanes*		
Width of Auxiliary Lanes*		
Width of Outside Shoulder*		
Width of Inside Shoulder*		
Cross Slope*		
Width of Median		
Stopping Sight Distance*		
Minimum Horizontal Curve Radius*		
Minimum K (Crest)*		
Minimum K (Sag)*		
Maximum % Grade*		
Maximum front slope (Unprotected Section)		
Maximum back slope		
Barrier Offset		
Superelevation Rate (%)*		
Bridge Width*		
Vertical Clearance*		
Structural Capacity*		
Horizontal Clearance *		
Width of clear zone		

General Notes:
- Use this form primarily for new construction or reconstruction projects.
* The Chief Engineer must approve design criteria deviating from the requirements of the Road Design Manual through the use Figure 3-4 "Design Exception Request."

Recommended By: _____
Project Manager

Recommended By: _____
Group Engineer

Approved By: _____
Assistant Director-Transportation Solutions

APPENDIX G—SAMPLE DESIGN EXCEPTION AND JUSTIFICATION FORM

TENNESSEE

Figure 3-1 (Continued) Design Exception and Justification Form

FACTORS CONSIDERED:

(Note: Each of the following factors shall be addressed in narrative form. If a factor is not applicable, or data is not available, only the appropriate box needs to be checked. For factors that are not a consideration, justification should be included.)

1) Accident experience or data
Data Available ☐ No Data Available ☐ Not Applicable ☐

2) Effect of the variance from the design standards on safety and operation of the facility
Effect considered ☐ No effect on the facility ☐ Not Applicable ☐

3) Safety mitigation measures considered and provided
Measures provided ☐ Measures not justified ☐ Not Applicable ☐

4) Compatibility of the design and operation with adjacent sections
Considered ☐ Not a Consideration ☐ Not Applicable ☐

5) Comparative cost of the full standard versus the lower design proposed
Considered ☐ Not a Consideration ☐ Not Applicable ☐

6) Long term effect of the reduced design as compared to the full standard
Considered ☐ Not a Consideration ☐ Not Applicable ☐

7) Difficulty obtaining the full standard such as right-of-way restriction, environmental impacts, etc.
Considered ☐ Not a Consideration ☐ Not Applicable ☐

8) Capacity reductions or operational reductions caused by the design
Considered ☐ Not a Consideration ☐ Not Applicable ☐

9) Level of service for the full standard versus the proposed design
Considered ☐ Not a Consideration ☐ Not Applicable ☐

10) Cumulative effect of more than one standard that is being reduced
Considered ☐ Not a Consideration ☐ Not Applicable ☐

11) Possibility of improving or achieving the full standard feature in the future
Applicable ☐ Not Applicable ☐ Not on the state highway system ☐

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