

# Design Flexibility Toolbox

## Formal Design Exceptions Practice and Procedure for Mn/DOT

### Design Exception Overview

**Definition:** A design exception occurs when a highway project design includes geometric design elements that fail to satisfy criteria set forth as policy by Mn/DOT and/or Federal Highway Administration (FHWA). Failure of a design to meet the standard for any of the 13 critical design elements (i.e. 13 critical controlling criteria, as defined by FHWA) requires approval of a *formal design exception*.

**Need for design exceptions:** It is Mn/DOT's general policy that every reasonable effort should be made to satisfy standard criteria for the critical design elements. However, standard values for these elements should not be strived for at all costs. On occasion, the judicious application of good design practice and engineering judgment – including consideration of economic, environmental and context-related factors – involves the use of sub-standard design elements to fashion an appropriate solution.

**Approval requirements:** The Mn/DOT State Design Engineer is the Department's approving authority for design exceptions and represents the only approval necessary for State administered projects as defined by the current Letter of Agreement and Stewardship Plan. For full Federal oversight projects, approval by the FHWA area engineer is also required.

**Road Design Manual reference:** Section 2-6.0, "Design Standards", contains discussion about critical design elements (2-6.01), general design elements (2-6.02) and geometric design exceptions (2-6.03).

**Federal document reference:** Federal-Aid Policy Guide NS 23 CFR 625, Non-Regulatory Supplement

### Design Exception Documentation Requirements

Design exceptions are identified, described and justified in the design standards documentation, which is required for most highway projects. The document form used for this purpose is the Design Memorandum, which serves to describe the project, discuss any pertinent or notable issues and record the standard design values for the critical criteria, along with the required documentation for design exceptions, if any. The Highway Project Development Process (HPDP) Handbook provides the pertinent process guidance on this subject, including requirements, objectives, form, content and circulation and processing procedure. The web address for this document is as follows:

<http://dotapp7.dot.state.mn.us/edms/download?docId=623068>.

The need for project geometric design documentation and design exception petition depends on the project work type. Complete guidance on these requirements can be found in "Which Standards to Use" section of the above-referenced document.

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## Formal Design Exceptions

### Documentation Format

A template electronic Design Memorandum document is available at the following web address:

<http://dotapp7.dot.state.mn.us/edms/download?docId=617906>. In summary, the document header follows the traditional memorandum format. Following immediately is the design exception approval signature block (which is omitted in the absence of a design exception). In the case of design exceptions, a registered professional engineer – customarily the project’s design engineer – signs where noted, thereby formally requesting the design exception and recommending it for approval. Two approval blocks are provided below this line, one each for the State Design Engineer and FHWA area engineer respectively. (“Not applicable” notation is provided in the FHWA signature box for the case of State administered projects not needing FHWA approval action.) Sections related to project background and design standards discussion comprise the main text body of the memorandum, followed by the geometric design standards table and design exception(s) discussion and justification. The geometric design table may be an attachment to the Design Memorandum or may be incorporated into its body.

### Documentation Format (continued)

There are four types of geometric design tables, any or all of which may be applicable depending on roadway type and degree of planned bridge construction. They may be found in and downloaded from the HPDP Handbook at the design documentation link given above. The tables contain hyperlinks to Road Design Manual and HPDP Handbook references. A proposed value not meeting standard criteria is customarily entered in the table preceded by an asterisk, signifying a design exception. For each critical element for which a design exception is registered, a justification discussion is required in the section so-noted.

### Evaluation Basis

FHWA Federal-Aid Policy Guide NS 23 CFR 625, #8b requires that “before an exception is approved there should be compelling reasons why the adopted criteria should not be used.” Based on this principle and Mn/DOT’s general policy stated above, every reasonable effort should be made to achieve standard values for the critical design elements.

Conversely, a design exception can be considered part of an acceptable design approach if providing a standard design proves to impose unreasonable negative consequences or burdens. As noted above, such burdens may include undue economic, environmental and/or context-related impacts to Mn/DOT or other affected parties. Furthermore, there may be cases where a standard design can be demonstrated to be impractical, illogical, disadvantageous, counterproductive or otherwise ill advised to the point of constituting an unreasonable proposal. In a similar vein, a design exception may be justified on the basis of realizing functional or safety advantages, improving modal balance or optimizing societal value in the overall holistic project realm. Regardless of the contention of the justification, the rule of thumb for successful design exception justification is that two conditions are successfully asserted:

1. No reasonable, feasible and practical solution can be devised to provide standard values for the critical design elements in question, OR the selection of a non-standard value or values for these elements is advantageous in some way or ways and results in an overall superior design, all things considered.
2. Use of non-standard values for the elements in question will not be expected to unduly degrade or hinder the safety or operational performance of the proposed facility.

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## Formal Design Exceptions

### Circulation and Approval Procedure

The circulation and processing procedure for a Design Memorandum with design exceptions is outlined on the HPDP Handbook's Design Standards Documentation front page, referenced above (Section I.C.3.c.). Once the appropriate engineer has signed the design exception signature block, district design staff mails the Design Memorandum to the State Geometrics Engineer, who initiates the processing procedure at Central Office. For State administered projects, one original signature copy of the document is sent; in the case of a full Federal oversight project, two original copies are signed and transmitted. Once it is received, the State Geometrics Engineer creates an entry for the project in a design exception tracking log, evaluates the exception and justification for merit and either contacts the district staff with any requested edits or presents the unedited design exception request to the State Design Engineer with a recommendation for or against approval. Once a design exception request for a State administered project is approved, the original signature document is returned to the district, and a copy is retained in the Geometric Design Support Unit (GDSU) file. For full Federal oversight projects, both signed original documents are transmitted to FHWA division administrator under a cover letter which, in addition to the project reference information, includes the following: the number of design exceptions, location(s) of the exceptions, type of design exceptions, (a) short description(s) of the exceptions, and summaries of the justifications. Upon final approval, FHWA retains one original signed document, sends one signed original to district design staff, and sends one copy of the approved document to the attention of the State Geometrics Engineer for filing.

Per the Letter of Agreement and Stewardship Plan, the goal for FHWA review and approval of formal design exceptions is a time frame of 14 calendar days. It should be noted that the "late submittal" deadlines given in the HPDP Handbook (Design Standards Documentation section) are based on this time frame.