

## INSTRUCTION FOR DESIGN EXCEPTION REQUEST - TRUNKLINE

### General Instructions

Design Exceptions (DEs) are part of the process that documents the decision making involved in the safety and budgeting impacts of designing the geometric elements of the roadway. (Refer to sections [3.10.03](#) and [14.11](#) of the Road Design Manual and section [12.03](#) of the Bridge Design Manual for information pertaining to DEs.). Review of geometric elements and evaluation of impacts should occur at the project scoping stage. If a Design Exception is needed, the Project Manager (PM) requests the TSC T&S Engineer provide a crash analysis to jointly review with their Lansing Geometrics engineer. The Crash Analysis must be specific to the location and crash types associated with the geometric element in question (refer to T&S website "[Safety Manual](#)" for guidance). The PM then initiates the Design Exception request(s) during the Scope Verification process using the latest form on the MDOT website to obtain approval by completion of the Base Plan stage. Crash Analysis provided by consultants require a written memo indicating approval by the TSC T&S Engineer, which is included with the Design Exception request.

It is suggested that the PM submit an unsigned draft design exception by email (cc their Lansing Geometrics engineer) to the FHWA area engineer (if oversight required per Risk Based Project Involvement Stewardship & Oversight plan) for review and comment prior to the DE being submitted to the Engineer of Design or Structures for approval. An appropriate preliminary plan, profile, and/or typical sheet should be included with the DE submittal to assist with review.

The unsigned DE is electronically submitted in ProjectWise by the PM. The Design Exception Engineer then reviews the DE for completeness and replies with any revisions. Once all of the revisions are incorporated, the PM then electronically signs the design exception and advances the State in ProjectWise. Approved DE(s) are required to be included with documents submitted for The Plan Review and Final Project Coordination meetings.

Early submittal is needed to allow a timely review by Lansing Design and the FHWA, including any follow up or re-submittal that may be required. Approval of a submitted design exception request should not be considered automatic. Disapproval of a design exception request can result from a number of deficiencies in the request. Grounds for rejection can range from insufficient justification, to use of an outdated request form. No special consideration is given for requests submitted late in the design process. It should be understood that meeting a project letting date is not justification for a design exception approval.

### I. Project Description

Use information provided in JobNet.

Control Section(s), Job Number(s) and PR Number(s). If more than one number exists, place the minor job or control section numbers in parentheses.

Check the appropriate box for construction guideline, National Highway System classification, and oversight. For projects with a mix of 3R/4R work, the work type with the greatest percentage of project cost controls the project work type (but not the work type standards for the DE).

**Location:** Include route name and number, mile point of beginning and ending roadways and the affected city/village/township/county. For bridge design exceptions include bridge number and control section (e.g. B01 of 41025).

**Description of Work:** Include length of fix (      miles of ... ) and all programmed work. Add other JN's and proposed work packaged with subject Job Number.

**Dates:** Include the scheduled Plan Review Date, Plan Completion Date, and Approved Letting Date. If the plan review date has not been determined, this date can be estimated.

### II. Legal Speed and Traffic Volumes

Fill in all fields of data for ALL DEs, except as follows. Commercial DDHV is used only to determine appropriate paved shoulder widths on freeways and should only be entered for freeway projects. Commercial DDHV should be obtained from Lansing Project Planning along with the initial traffic data request using the check box on [Form 1730](#). Planning uses the following formula: Commercial DDHV = Directional ADT (which includes a directional factor ~50% - 60% x Lane Distribution Factor (generally varies 70% - 90%) x % DHV (~9% - 12%) x % Commercial.

The % Commercial may be different for Commercial DDHV than what is used for the Life Cycle Cost Analysis, consequently, the use of the check box on [Form 1730](#) will ensure obtaining the appropriate Commercial DDHV.

### III. Design Exception Elements

A separate Design Exception is needed for each geometric element requested. Choose the appropriate element from the drop down provided.

There may be multiple locations in each Design Exception. Number multiple locations throughout the form. Organize edits to avoid splitting fields onto different pages. When a spreadsheet attachment is used 'see attached' in itself is not an acceptable entry. A general description, i.e. # of locations, roadway/ramps (A, B, C ...), range of dimensions, etc., is needed to correlate with the spreadsheet information.

Describe the existing roadway/bridge geometric features (pavement section, number of lanes, boulevard, freeway, urban, rural, length of bridge ...) and related DE data (radius, super, K-value, HSO) for the identified geometric element at each location. Include numerical values and limits (for example, cross slope is parabolic, or shoulder is 7' paved (8' usable) from Station 123 to Station 456 (m.p. ??? to m.p. ???). Provide mile point correlation at each location with those used in the crash analysis.

For design exception elements for bridges, note whether existing structure is posted for less than legal loads.

Note: For vertical clearance exceptions on Interstate freeway bridges, the Project Manager is responsible for obtaining Military Defense Approval. Refer to Road Design Manual [3.12H](#) or Bridge Design Manual [7.01.08](#) and related appendix for information and obtain latest fillable [Form 0333](#) from the website. Include a copy of the request and the military's response with the design exception submittal.

Cite the specific MDOT and AASHTO requirements, for example,  $K=120$  or  $e=5.4\%$ , etc. State the pertinent source(s), such as Standard Plan or Special Detail, Road or Bridge Design Manual, or Geometric Guide, with the chapter, page, exhibit number etc. For an AASHTO reference, include "A Policy on Geometric Design of Highway and Streets, 2011" or "A Policy on Design Standards, Interstate System, 2005". Cite appropriate edition (year). Note: Standard Plan R-107 at 7% Emax and the Straight-Line Chart at 6% Emax have been developed to meet AASHTO criteria for super elevation requirements per Methods 5 and 1, respectively, on page 3-26, and for radius per Equation 3-8 on page 3-31 of the 2011 Geometric Book and are the appropriate references for AASHTO Criteria. Use of the AASHTO 6% Emax table for Straight Line Chart or interpolation of the 6% & 8% table to obtain a 7% Emax value are not appropriate due to curvilinear fiction factors used in the tables. Since the FHWA has accepted MDOT criteria for the rate of super elevation, this statement should be entered under "AASHTO Criteria" when the DE element is super elevation rate. Other AASHTO methods are not applicable with MDOT projects

## Proposed Design Values

Describe the proposed design value for design exception element as shown on the project plans. "Match existing" is not a sufficient description unless all deficiencies have been specifically reported in the description of existing features section. Elaborate on application of data. State what design speed improvements, if any, are attained with the design. If more than one location applies (e.g., three curves with super elevation), list all including stationing.

## Safety Review/Crash Analysis

Provide a site-specific, predictive [Highway Safety Manual \(HSM\)](#) crash analysis for the requested geometric element. If a specific HSM model does not exist, and other predictive resources have been exhausted, perform a crash analysis using the most recent 5 years of data available in RoadSoft. Do not include UD-10 or other traffic data. These data are reviewed by T&S personnel and are the basis of the conclusion stated in the crash analysis that is used to support the design exception request. For a vertical clearance exception, the crash analysis must include discussion regarding High Load Hits (HLH) in the Maintenance data base.

Don't use a generic scoping Safety Review in place of the site-specific crash analysis. A conclusion in support of the design exception at each location is needed. Refer to the Traffic and Safety web site for instructions and an example of a typical Crash Analysis. Contact the Lansing Geometrics Engineer for additional assistance. If a consultant provides the crash analysis, the report must be submitted with a memo indicating approval by the TSC T&S Engineer. The Project Manager is responsible to coordinate the use of PR/CS miles points and stationing in the crash analysis with those used in the design exception, particularly when multiple locations are in one crash analysis.

## Impacts Other Than Costs

Describe other major impacts that would occur if the required design standard was met. Elaborate as to what would have to be altered. Reference any related ordinances, environmental documents, legislative resolutions, etc. and attach a copy of the referenced pages.

## Programmed Cost

State programmed project construction cost per latest funding change request from JobNet. Exclude CE costs. Separate Job Number, bridge/road budgets.

## Increased Cost to Meet Design Criteria

Itemize cost of meeting the design standard and related major impacts (e.g., pavement, shoulders, slope work, ROW, structures, drainage, large or box culvert, wetland mitigation, peat excavation/backfill, if significant). Itemize major road/bridge cost items. Attach a separate sheet, if needed.

## Proposed Mitigation

Describe and state (include numerical values) partial improvements of all related design features and mitigation measures, if any. Identify future work programmed to complete improvements. Include Job Number and construction year, if available. Review merits of advisory signs, lighting, 'no passing' pavement markings and signing with T&S Engineer for horizontal curve radius, stopping sight distance, super elevation rate, lane width and shoulder width design exceptions. Refer to T&S [Traffic Sign Design, Placement, and Application Guideline and MUTCD 2C](#). Consider other safety features such as HMA ribbons, corrugated shoulders, chevrons, etc. A predictive Highway Safety Manual crash analysis must be used to correlate proposed mitigation to the issue.

## Additional Comments

Provide a summary statement or state any other extenuating circumstances to be considered. Discuss the benefits of partial improvements, if attained. State the job number of a future project, if programmed, which will rectify the excepted feature. State whether or not the crash analysis supports the DE request.

## Miscellaneous

Signature box: After the Design Exception Engineer's review, attach an electronic signature in appropriate box. The dated signature stamp of the Project Manager certifies the completeness, accuracy and necessity of the Design Exception request. When a project has federal oversight but FHWA approval is not required, the Engineer of Design or Structures will note in the FHWA signature box that approval is 'not needed'. When FHWA approval is required, Design will "change state" to forward the DE to FHWA.

On a project where bridge plans are included with a "large" road project and the Project Manager of record is someone other than the Bridge Design Engineer (and therefore signing the Design Exception form), the Bridge Unit Leader or Bridge Consultant Manager must provide a signed memo stating that they have reviewed the Design Exception for the bridge(s) and concur with its contents. This signed memo to the Engineer of Design Operations – Structures will be attached to the Design Exception and reference made to the author and date in Additional Comments Section.