

Memo

New Mexico Department of Transportation

SUBJECT: Infrastructure Design Directive
IDD-2006-04 (Design Exception & Design
Variance Procedures)

DATE: 2-013-2006

TO: Office of Infrastructure Divisions
Transportation Design Community

FROM: Steven P. Harris, Chief Engineer
Office of Infrastructure Divisions



FILE REFERENCE:
PSESHARE:Design Directives

Attached to this memo are the revised Design Exception & Design Variance Procedures. The procedures and guidelines were developed in partnership by the Federal Highway Administration and Department of Transportation and serve as the Department's policy for requesting design exceptions and design variances. The policy conforms to the minimum requirements set forth by the Federal Highway Administration (FHWA) regulations for design exceptions.

Every design team is encouraged to become familiar with these procedures as you will ultimately be responsible for applying these to your projects as applicable.

As a reminder, the Design Directives reside in the PSESHARE drive. General Office staff is to utilize the \\asgopinon\pseshare drive to access the Directive. District and Regional Office staff can access the Directive utilizing the appropriate District drive as indicated below:

District 1	\\d1flsv03\design\$
District 2	\\d2flsv01\public\pse_section
District 3	\\d3flsv03\ps&e_section
District 4	\\d4flsv04\designshared
District 5	\\D5flsv02a\D5Design
District 6	\\d6flsv02\pse_section

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Infrastructure Design Division

Design Exception & Design Variance Procedures

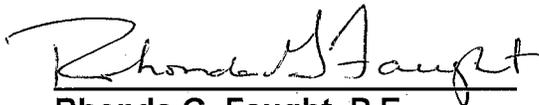


**Design Exception & Design Variance
Procedures
Of the
New Mexico Department of Transportation**

January 2006

The following procedures and guidelines were developed in partnership by the Federal Highway Administration and the New Mexico Department of Transportation and serve as the Department's policy for requesting design exceptions and design variances. The policy conforms to the minimum requirements set forth by the Federal Highway Administration (FHWA) regulations for design exceptions.

Approved:



**Rhonda G. Faught, P.E.
Cabinet Secretary**



**J. Don Martinez, Administrator
Federal Highway Administration**

I. Introduction

The following procedures and guidelines are the New Mexico Department of Transportation's (NMDOT) policy for requesting design exceptions and design variances. NMDOT's policy conforms to the minimum requirements set forth by the Federal Highway Administration (FHWA) regulations for design exceptions.

II. Design Criteria Authority

A. Authority

The New Mexico State Statutes Section 41-4-11 describes overall design immunity relating to highways and streets and deviations from standard geometric design practices.

FHWA's regulations for design exceptions are located in the Title 23 Code of Federal Regulations (CFR) Section 625.3(2) (f) (i) (ii). This section defines exceptions as, "designs which do not conform to the minimum criteria as set forth in the standards, policies, and standard specifications for: experimental features on projects and projects where conditions warrant that exceptions be made."

The minimum standards, policies, and standard specifications are set forth in Title 23 CFR Section 625.4. Title 23 CFR 625.4 (a) (2) for Roadway and Appurtenances, adopts "*A Policy on Geometric Design of Highways and Streets*", AASHTO (Green Book) as a standard. NMDOT has accepted the AASHTO (Green Book) as its design standard for geometric design. For projects on the Interstate system, the "*AASHTO Policy on Design Standards Interstate System*" supplements the Green Book standards.

III. Design Exception Criteria

Design exceptions were first identified in FHWA Technical Advisory 5040.21 dated April 4, 1983, which established 11 factors to be addressed on Resurfacing, Restoration, and Rehabilitation (3R) projects.

In April 5, 1985 the design exception process was updated with implementation memorandum titled "*Implementation of New Design Criteria for Federal-Aid Projects*," which established 13 controlling criteria. More recently the design exception process was further explained in NS CFR 23 625, Federal-Aid Policy Guide, dated March 1, 2005, Transmittal 33.

The following 13 controlling criteria require formal approval from the FHWA:

1. Design Speed*
2. Lane Width
3. Shoulder Width
4. Bridge Width
5. Structural Capacity
6. Horizontal Alignment
7. Vertical Alignment
8. Grades
9. Stopping Sight Distance
10. Cross Slopes
11. Superelevation
12. Vertical Clearance
13. Horizontal Clearance* (other than "clear zone")

* From the Federal Aid Policy Guide: two items, horizontal clearance and design speed, warrant some further explanation and discussion.

- (a) Horizontal Clearance: A recovery area clear of unyielding objects should be established for all projects. Criteria from the AASHTO Roadside Design Guide should be treated as guidance for setting individual project or statewide criteria or policies, not as a national standard requiring a design exception if not met.
- (b) Design Speed: Design speed is a concept by which coordination of the various physical design elements is achieved. Design speed has a significant effect on the operation and safety of a highway because it is used to determine various individual design elements with specific dimensions such as stopping sight distance or horizontal curvature. Therefore, a "design speed exception" is necessarily an exception to individual physical design elements and accordingly must be justified on that basis.

IV. Design Variance Criteria

A design variance is a variation from a design parameter other than the 13 controlling criteria discussed above, or any deviation from a State Statute, or a Department design standard or policy.

V. Evaluating & Analyzing Project Criteria

Design exceptions and variances should be requested as early as possible in the Project Development process, desirably as part of the Scoping Report. This will minimize the likelihood of an extensive re-design effort should any part of the request be denied. Late requests for design exceptions received

by the final approving official could result in substantial delay to the project letting.

Some project conditions that may warrant design exceptions or variances could be the extreme difficulty or high cost of obtaining right-of-way, cost of construction, mitigation of environmental impacts, or the preservation of historic or scenic values of the location. The careful application of the flexibility provided in the design standards and policies, appropriate use of design exceptions or variances, and coordination with transportation enhancement activities can result in projects that provide safe and efficient transportation facilities and are sensitive and responsive to scenic and historic resources.

It is important to consider the impact of the design exception or variance to the safety and operations of the facility as well as its consistency and compatibility to adjacent sections of roadway. The following are some of the factors that should be considered and documented:

1. Functional classifications of the road.
2. Amount and character of traffic (e.g. AADT, % heavy commercial, etc).
3. Type of project (e.g. 3R, new construction).
4. Crash history. What are the prevalent crash types and how do they relate to the existing conditions and proposed design features?
5. The cost effectiveness of the exception compared to minimum standards. Estimate cost of exceptions and that of minimum design.
6. Project constraints and justification for the exception or variance.

Depending on the nature of the variation from the design standard, it may not be necessary to look at all of the above factors. However, before a design exception or variance is approved there should be compelling reasons why the adopted standard or criteria should not be used. Three issues should be considered in any analysis: (a) what is the degree to which a standard is being reduced; (b) will the exception affect other standards; and (c) are there any additional features being introduced, e.g., signing or delineation, that would mitigate the deviation?

VI. Documentation of Design Exceptions & Variances

All Design exceptions and variances require submittal for approval and should include sufficient details and/or drawings to describe the project, conditions

warranting a design exception and/or variance along with sufficient information to answer the following and serve as the justification:

1. What is the degree to which the standard is being reduced? State specific appropriate AASHTO or Department standard or policy.
2. What will be the effect on safety and operations (provide data, research, crash data analysis or basis of professional judgment)?
3. Will the exception or variance affect other standards?
4. What measures are provided to mitigate the deviation?
5. How does the exception or variance relate to adjacent sections of the roadway? Is consistency provided?
6. Has there been historical evidence that would indicate that an exception or variance would sacrifice the improvements established by a minimum design standard? (i.e. flooding, irregular maintenance, etc.)
7. What is the value realized by applying an exception or variance (i.e. resource impacts/benefits, social impacts/ benefits, cost impact/benefits, timeline impact/ benefits, etc.)?
8. Other options considered.

VII. Review and Approval

A. Federal Oversight Projects

These requests require FHWA approval and should be formally transmitted to the FHWA by letter. The request should be initiated by the responsible professional engineer (e.g. Project Development Engineer, Consultant, District Engineer, etc.), concurrence is required by the Regional Design Manager and the Chief Engineer and approval granted by the Division Administrator (or designee) of the FHWA.

B. State Oversight Projects

These requests require State approval and should be formally initiated by the responsible professional engineer (e.g. Project Development Engineer, Consultant, District Engineer, etc.), concurrence is required by the Regional Design Manager and the State Construction Oversight Engineer with approval granted by the Chief Engineer.

C. Interstate and National Highway System (NHS):

If the FHWA is involved in reviewing and approving plans, specifications and estimates for any Interstate or NHS project, then it also must review and approve design exceptions and variances to standards applicable to that project.

On those NHS projects on which the State has elected to apply one of the 23 U.S.C. 106(b) exemption provisions, which are administered under certification acceptance, or which are funded by other than Federal-aid funds, the State may approve design exceptions and variances, but it must evaluate and document the decision as if it were doing it for the FHWA. Design exceptions and variances approved by the State for FHWA are subject to FHWA oversight through periodic process reviews.

D. Non-NHS -- Surface Transportation Program (STP):

For projects under State oversight not on the NHS the Department will be responsible for processing and approving design exceptions and variances according to the procedures outlined in this document.

E. Non-NHS -- District Betterment Projects:

For District Betterment Projects that are 100 percent State funded, design exceptions will not be required except when:

1. Pavement cross slopes are less than 1.5 percent.
2. There is a conversion of a shoulder to a riding lane.
3. There is a lane width reduction.

The scope of these projects is to maintain, preserve or extend the service life of an existing roadway pavement, structure or drainage facility. Such projects are not intended to update the geometrics to current standards. AASHTO and other Department standards that were in effect at the time of the original construction will apply. This shall be noted in the plans and it shall be recorded as "This section of highway was originally built under (Route, Section) using design standards as per the (date) AASHTO publication entitled (name of publication) or Department publication entitled (name of publication). However any substandard features created, or existing features made worse, must be covered by an exception or variance since such actions in effect change the project as built.

Examples of projects in this category are chip-seals, mill and inlay, minor resurfacing, crack-sealing, guardrail installations, heater remix, spot drainage structure extensions, and curb & gutter repair.

VIII. Repository & Follow-up Requirements

A. Record Keeping

The project files must include all approved Design Exception and/or Design Variance information. Additionally a central filing system shall be maintained containing all Design Exceptions and Design Variances at each Regional Design Center. FHWA maintains its own file on design exceptions, thus copies of State approved design exceptions on State oversight projects should be forwarded to the New Mexico Division FHWA office.

B. Follow-up Requirements

The project authorization process must acknowledge if a Design Exception and/or Design Variance is applicable and approved accordingly for every project or otherwise certify to FHWA that no exceptions or variances exist.

STRAHNET

The STRAHNET is a system of highways that provides defense access, continuity and emergency capabilities for movements of personnel and equipment in both peacetime and wartime.

For projects on the STRAHNET System, exceptions to the minimum 16' vertical clearance must be coordinated with the Surface Distribution and Deployment Command, Transportation Engineering Agency (SDDCTEA) prior to approval of a design exception. The office approving the design exception, whether it is the FHWA Division or NMDOT under 23 USC 106(b), should notify the SDDCTEA directly. For projects on the Interstate System, not on the STRAHNET System, prior coordination is not required, but FHWA policy provides that SDDCTEA be notified of vertical clearance exceptions.

Director, SDDCTEA, Attn: MTTE-SA, 720 Thimble Shoals Blvd., Suite 130, Newport News, VA 23606-2574 (telephone: 757-599-1117, Fax: 757-599-1560)

IX. Examples

Figures 1 and 2 provide typical format examples for submittals of design exceptions and variances.

New Mexico Department of Transportation

Division Administrator
FHWA, New Mexico Division
604 W. San Mateo Road
Santa Fe, New Mexico 87501

Subject: Design Exception / Design Variance
State Project Number
Control Number
County
Termini
Description

Technical Data

Functional Classification: _____	Terrain: _____
Current AADT/Year: _____	Design AADT/Year: _____
Current DHV: _____	Design DHV: _____
Current % Trucks: _____	Design % Trucks: _____
Posted Speed: _____	Selected Design Speed: _____
Crash Data (Number): _____	Crash Data (rates): _____

Design Exception/Variance

Design Standard or Policy Criteria: _____
Reference or Policy: _____

Proposed Design Criteria: _____
Location (as applicable): _____

Justification

1. What is the degree to which the standard is being reduced?
2. What will be the effect on safety and operations (provide data, research, crash data analysis or basis of professional judgment)?
3. Will the exception or variance affect other standards?
4. What measures are provided to mitigate the deviation?

Figure 1 – Design Exception/Variance for Federal Oversight Projects

5. How does the exception or variance relate to adjacent sections of the roadway? Is consistency provided?
6. Has there been historical evidence that would indicate that an exception or variance would sacrifice the improvements established by a minimum design standard? (i.e. flooding, irregular maintenance, etc.)
7. What is the value realized by applying an exception or variance (i.e. resource impacts/benefits, social impacts/ benefits, cost impact/benefits, timeline impact/benefits, etc.)?
8. Other options considered.

Request By:

Responsible Professional Engineer

Concurrence:

Regional Design Manager

Chief Engineer

Approval:

(comments)

Federal Highway Administration

Figure 1 cont'd. – Design Exception/Variance for Federal Oversight Projects

New Mexico Department of Transportation

Chief Engineer
Office of Infrastructure Divisions

Subject: Design Exception / Design Variance
State Project Number
Control Number
County
Termini
Description

Technical Data

Functional Classification: _____	Terrain: _____
Current AADT/Year: _____	Design AADT/Year: _____
Current DHV: _____	Design DHV: _____
Current % Trucks: _____	Design % Trucks: _____
Posted Speed: _____	Selected Design Speed: _____
Crash Data (Number): _____	Crash Data (rates): _____

Design Exception/Variance

Design Standard or Policy Criteria: _____
Reference or Policy: _____

Proposed Design Criteria: _____
Location (as applicable): _____

Justification

1. What is the degree to which the standard is being reduced?
2. What will be the effect on safety and operations (provide data, research, crash data analysis or basis of professional judgment)?
3. Will the exception or variance affect other standards?
4. What measures are provided to mitigate the deviation?
5. How does the exception or variance relate to adjacent sections of the roadway? Is consistency provided?

Figure 2 – Design Exception/Variance for State Oversight Projects

6. Has there been historical evidence that would indicate that an exception or variance would sacrifice the improvements established by a minimum design standard? (i.e. flooding, irregular maintenance, etc.)
7. What is the value realized by applying an exception or variance (i.e. resource impacts/benefits, social impacts/ benefits, cost impact/benefits, timeline impact/ benefits, etc.) ?
8. Other options considered.

Request By:

Responsible Professional Engineer

Concurrence:

Regional Design Manager

State Construction Oversight Engineer

Approval:

(comments)

Chief Engineer

Figure 2 cont'd. – Design Exception/Variance for State Oversight Projects