2016 Preconstruction Conference

Design Exceptions

Lesly Tribelhorn – Highways Engineer
Ryan Dahlke – Consultant Design Engineer
What are we going to talk about today?

- Elements that do and do not require a design exception
- New design exception report template
- Timing of pursuing a design exception
- Valid reasons for a design exception
- Questions & Answers
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First up --- historically, there has been confusion and a lack of clear expectations on what does and does not require a design exception

• Let’s start with a quiz
Design Exception needed?

True or False

The width of the flat bottom ditch in a cut section is reduced from 10’ wide to 6’ wide to reduce impacts to adjacent property.
While the width of the flat bottom ditch in a cut section is a design standard, it is not one of the controlling criteria that require a design exception.

- FALSE --- This has caused confusion in the past, as it reduces a standard design element

- Ditch width by itself does not require a design exception, but needs to be vetted by the design team to ensure it is best for the project

- HOWEVER..... If the reduced ditch width results in the toe of the backslope being in the clear zone, then that may require a design exception if the ditch configuration falls outside the preferred ditch section
Design Exception needed?

True or False

Fill slope at a single cross-section steepened to 5:1 from the standard 6:1 to be congruent with adjacent sections.
• TRUE --- This may often be done just because it makes common sense from a constructability congruency perspective

• Likely to get approval if it makes sense and is very limited

• Makes sense if numerous cross-sections before and after are 5:1, but BE CAREFUL with this. If slopes bounce back and forth between 6:1 and 5:1, strongly consider making the 5:1’s into 6:1’s to make it congruent.

Any slope that is modified to anything less than the standard, for any reason, requires documentation in a design exception report.
Design Exception needed?

True or False

In order to reduce impacts to a Fishing Access Site, the cross slope on a right turn lane is steepened to 3%.
TRUE!

Modifications to the cross slope of any travel lane, including auxiliary lanes, requires a design exception.
Design Exception needed?

True or False

In order to achieve drainage, the cross slope of a 10 foot shoulder in an urban, curbed facility is steepened to 4%.
FALSE!

While modifications to the cross slope of a travel lane requires a design exception, it does not apply to shoulders.
True or False

The Green Bay Packers and the Pittsburgh Steelers are going to the Super Bowl.
TRUE!

..... it just might not be this year. 😞
• New Road Design Manual more clearly specifies which elements require a design exception.

• Number 1: Many things go into design speed selection, not just reading the table. We won’t be diving into the intricacies of design speed selection here..... But as it relates to the design exception world...... a design speed that is LESS THAN what is in the table requires a design exception.

• Number 2: Like the old Pontiac Grand Prix advertisements tout.......wider is better! So if anyone wants to incorporate a 17’ wide driving lane.... Good news ... you don’t need a design exception! If you go narrower, not the case.
  • Remember..... This applies to shoulders, passing lanes, and turn lanes as well.

• Number 3: Remember..... This applies to passing lanes and turn lanes as well.

• Number 4: As any good old Geotech will tell you..... Flatter is better!! So go ahead..... Flatten that slope and leave it out of the design exception. Just get ready to answer to our Environmental friends and your friendly DA!

• Number 5: Don’t forget to check the sight distance around a horizontal curve.....particularly in cut sections!
Controlling criteria requiring a design exception

6. Superelevation rate (any variation – more or less)
7. Vertical alignment
   • Stopping sight distance (crest and sag curves)
   • Grades (only if steeper, not flatter)
8. Vertical clearance (anything less than minimum)
9. Roadside clear zones
   • Obstructions within the clear zone
10. Intersection sight distance
11. Structural capacity

• Number 7:
   • Sag vertical curves -- the key is headlight illumination. Can be critical when approaching a stop sign or in high pedestrian areas.
   • Grades -- only if steeper, not flatter.....DUH.
   • NOTE: These are now combined.....used to be separate

• Number 8: Let’s try to avoid peeling off the top on too many semis.

• Number 9: An obstruction is anything harmful to an errant vehicle, including:
   • bridge piers
   • critical side slopes
   • non-preferred ditch sections
   • non-traversable culvert ends
     • Take a note here...... a 24” culvert with a FETS is not traversable!

• Number 10: Applies to ANY approach..... public, private, AND farm field

• Number 11: For all those structures we build to less than the structural capacity stipulated in the MDT structures manual, we need a design exception. 😊
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- Template has been updated to be more robust and to better document the steps that were taken, factors that were considered, and mitigation measures implemented
- Also matches changes in Road Design Manual
- Meets FHWA requirements for NHS
Design Exception Template

New template available on internet at:

http://www.mdt.mt.gov/publications/forms.shtml#con

Or on intranet at:

Mdtinfo → Resources → Forms/Templates → Highway Design Milestone Report Templates

• Templates (PoDI and non-PoDI) are available on the intranet and the external internet web pages
Executive Summary
The executive summary should describe what you are seeking for a design exception. Provide a description of the features that will require an exception to approved design standards. The executive summary should summarize the design exception submittal and should include the following:
- Brief description of proposed project
- Listing of the controlling criteria for which a design exception is requested
- Recommendation for proposed value

Proposed Project
This section should describe the proposed project, its purpose and intended outcomes, as well as outline the benefits this project will have on the overall transportation system.

A. Description and Scope of Work
   Describe general project information and scope of work. Provide a brief description of the features of the project (i.e. horizontal and vertical curve discussion, number and width of lanes and shoulders, new structures, upgraded or eliminated guardrail, rumble strips, side design, etc.), and state which design features will be used in place.

B. Purpose and Need
   Provide the project purpose and need in this section. Consider providing comments regarding purpose and need's relationship to operations, safety, capacity, 3R, or other deficiencies anticipated to be improved.

C. Public perception
   This subsection should address the social context in which the project is proposed and how project has been received by stakeholders and the surrounding community.

Existing Conditions
This section should address the existing conditions in which the project is being proposed, and provide the context to better understand the potential impact of the design exception.

A. Project Location and Roadway Character
   Some of the descriptions that may be used to briefly describe the project location include:
   - City name;
   - County name;
   - Location.

- Format
- Content
  - What we’re looking for
    - Description of what the design exception is for
    - Graphical display (electronic or paper)
    - Reasons for it
    - Reasons we can’t design to standards
    - Mitigation measures (additional mitigation measures, not just improvements to the facility that we’re doing as part of the project anyway)
    - Options considered
    - Safety implications
  - Only PoDI’s require FHWA approval
Example of Executive Summary section

Executive Summary
We request that you approve an exception to the design criteria for principal art Interstate) to allow the use of the following design features on the reconstructed

- A 36-ft. finished top width, consisting of two 12 ft. travel lanes and tww the current AASHTO minimum top width of 40 ft. (8 ft. shoulders) for specified AADT.
- Barn-roof fill slopes with 6:1 recoverable and 3:1 to 4:1 non-recoverabl locations.
- Clear zone encroachments for the following:
  - One location where a stock-pass culvert end is at the base of a :
  - Five locations where riprap is partially within the 6:1 clear zone fill transitions.
  - Two locations where wetlands are present at the base of 3:1 fill.

The design exception requested is a practical way of addressing the existing cor without significantly increasing the impacts and costs on this project.
Example of safety impact analysis
Example of graphical display
Example of graphical display
Link to FHWA Publication

*Mitigation Strategies for Design Exceptions*

July 2007

http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/

Resources
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So when is the appropriate time to get a design exception approved?
When to get approval?

✓ Earlier is better!
✓ Multiple design exceptions are okay
✓ Get buy-in from design team

• As the old adage goes...... the sooner the better.

• More than one design exception is okay.

• Buy-in from the design team and formal approval is best as soon as it is known that a design exception is forthcoming.
Let’s look at a good example of design team member making a case for a design exception to the design team.

This type of supporting justification is perfect for a design exception report.
Design Team buy-in

Category I wetlands as identified in the HER and 406(h)1 Evaluation for the Kawhia N.W. 5 project are listed below. The numbers and corresponding stations are based on current plans:

- Wetland 5A and 5B: Station 006-006.9 + 00 Station 005-999.9
- Wetland 5D, 5C, 5E, and 39 and Wetlands 3A, 40, and 41: Station 669-738 Left and Right

Core Reason #2: For design exception request.

Commitments to Resource Agencies or other parties may be considered.

First report

<table>
<thead>
<tr>
<th>Station</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>619.50 - 635.00 Left</td>
<td>The attached table indicates that from Station 619.50 to 635.00, there was an approved design exception for Category I wetlands. However, from 619.50 to 635.00 Left, the design was for Category I wetlands and an additional exception was not approved.</td>
</tr>
</tbody>
</table>

Second report

<table>
<thead>
<tr>
<th>Station</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>631.00 - 635.00 Left and Right</td>
<td>Station 5A, 006-006.9 + 00 Station 005-999.9. The Category I wetlands adjacent to the roadway are not to be considered evident ditches, but are a continuous wetland protector complex that excuses right and left to the roadway.</td>
</tr>
</tbody>
</table>
Design Team buy-in

noted in attached table that were approved for design exception. This area falls into the Category 1 wetland range and the associated accepted language in the ROD, FEIS, 404(h)(1) analysis, and the BO conservation measures.

Steepening slopes as recommended above will satisfy the accepted language in the ROD and the conservation measures in the BO.

Station ranges not recommended for consideration of steepened slopes and potential supplemental design exceptions:

- 606+00 - 626+00 Left and 605+90 - 607+00 Right
- 604+90 - 606+00 Left and Station 607+00 Right

Wetlands located from Station 606+00-626+00 Left and Station 605+90-607+00 Right are being almost completely avoided by shifting the alignment away from the wetlands south (Left) of the roadway. There are usual unavoidable impacts to wetlands where the alignment/grading associated with these wetlands crosses the roadway at Station 605+71 where MIT is installing a new culvert.

Station 684+50 - 691+00 Left and Right

Wetlands and riparian areas located from Stations 684+50-728+00 Left and Right are associated with and adjacent to Lake Creek South Fork Cut Bank Creek, and the various side and overflow channels of these creeks. However, from Station 684+50 Left and Right to Station 691+00 Left and Right wetlands are located primarily in the ditch immediately adjacent to the roadway, aside from a few narrow areas where wetlands extend out perpendicular to the roadway. In this section of roadway, very little wetland or riparian area would be preserved by steepening the slopes from 6:1 to 4:1, as 4:1 slopes would also impact these wetlands located in the ditch.

Includes compromise. These locations fall within class 1 wetlands identified earlier, but demonstrate common sense, which strengthens case for actual removing design exceptions.

Considers value – the beneficiaries.
When to get approval?

- Earlier is better!
- Multiple design exceptions are okay
- Get buy-in from design team
- Preliminary discussions with approver encouraged
- Don’t wait until Contract Plans submittal date!

- Avoid putting approver in an uncomfortable position of feeling pressured to approve the design exception because it’s too late to say no

- Avoids extensive redesign effort and propensity for errors late in the process
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General discussion on what are viable reasons for a design exception
- Reducing/Eliminating R/W
- Wetlands
- Constructability
  - Sliver fills/cuts
  - Consistency with adjacent slopes
  - Etc.
- Cost
  - Grading, R/W, etc.
- Project delay
  - Does sacrificing design standards now warrant getting the new road built now instead of a year or two later?
- Others reasons?
Valid reasons for a design exception?

You decide......
Spiral curve requirements: New criteria. Old standard required spirals on flatter curves than is required with the new standard. Do you need a design exception if you choose to maintain the old standard? It depends.....