

What is the Design Exception Process?

- It is the procedure followed to document the physical, social, environmental or economic constraints that prevent the application of a specific highway design criteria or standard.
- The process is intended to acknowledge and document concurrence that fulfillment of a particular design standard requires an unreasonable impact or expense.



From the Design Exception Guidelines:

Why is a Design Exception necessary?

- NCDOT policy states all projects shall meet the minimum AASHTO or Sub-Regional Tier standards.
- Failure to meet the minimum standards requires a Design Exception.
- It formally documents the "why's" of selecting design criteria that do not meet accepted standards.
- Note: An exception is not applicable when unmet criteria are only at locations where a project ties to existing conditions.



Bullet 1: FHWA guidance says all NHS projects. NCDOT extends that to ALL STIP projects.

<u>Bullet 3</u>: Could be used for legal defense should legal actions arise. Shows that thought and judgement went into the decision.

<u>Bullet 4</u>: If the only exception is to facilitate a tie to existing, it does not have to be documented. The project has to end somewhere.

What do we check for in a Design Exception?

13 Design Criteria

- Design Speed
- Lane Width
- Shoulder Width
- Bridge Width
- Structural Capacity
- Maximum Grade
- Horizontal Alignment (Min. Radius)

- Vertical Alignment (Crest & Sag K Factors)
- Horizontal SSD
- Vertical SSD
- Cross Slope
- Superelevation
- Horizontal and Vertical Clearance



Comments on Specific Design Criteria:

- Structural Capacity must be determined by the Structural Engineer not the Roadway Engineer.
- Vertical SSD is usually determined mathematically using the formula in AASHTO.
- Horizontal SSD is usually determined graphically.
- Horizontal and Vertical Clearances over a roadway or railroad. (Some get this horizontal clearance confused with the horizontal offset on the bridge used to determine bridge width.)

Transition: Changes for Design Exceptions:

- FHWA involvement Oversight Agreement
- Reduction in required elements.

New FHWA guidance for NHS \geq 50 mph

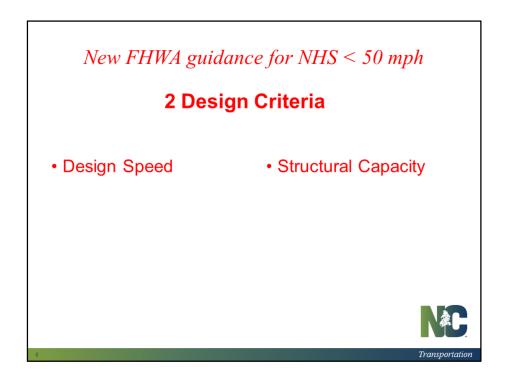
10 Design Criteria

- Design Speed
- Lane Width
- Shoulder Width
- Maximum Grade
- Minimum Horizontal Curve Radius
- Stopping Sight
 Distance (Horizontal and Crest Vertical)
- Cross Slope
- Superelevation
- Vertical Clearance
- Structural Capacity



Design elements no longer requiring Design Exceptions include:

- Bridge Width
- Vertical Alignment
- Stopping Sight Distance for sag vertical curves
- Horizontal Clearance



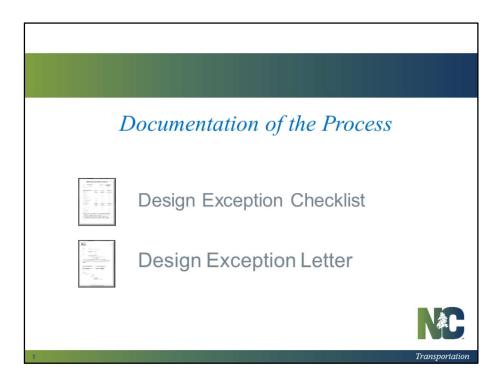
Note that Design Speed plays into many of the other design criteria so this is not allowing a free for all.

When is a Design Speed Exception needed?

- If several of a project's design elements are in violation of standards.
- If a single design element is in violation of the standard for the majority of the length of a project.
- If the design speed of the element(s) in question are significantly below the standard.



This plays directly into the Design Speed discussion from the previous slide.



Next we will look at the two parts of the Design Exception documentation process.



Standard AASHTO Checklist:

Three columns:

Proposed design values AASHTO standard values Is an exception required?

This example project required a design exception for Vertical Clearance.

		ems not requiring an approved design exception, eed should be equal to the higher of either the	
	eed or the minimum "Greenbook" value for		sk. PE
	ign speed is less than the posted or statutor		Sobrezional
	ure Design's responsibility - be sure they ha	ave checked for need of design exception.	
	lement only meets 45 mph design speed.	1	respice Reg'd
	lement only meets 25 mph design speed.	1	NONO
	lement only meets 20 mph design speed.	1	YES NO
(7) This e	lement only meets 30 mph design speed.	1	NO NO
	Bridge Width NA	mode with 55,410 % %	NO NO
	Structural Capacity ^(l) N/A	Structural Capacity ⁽³⁾ HL-93 HL-93 HL-93	NO NO
	Maximum Grade 2:30%	Maximum Grade 8.53% 6% 6% 6%	YESYES
	Min. Horizontal Curve Radius 19107	Min. Horizontal Curve Radius 200'm 1500' 1500'	YESYES
	Sag Vertical Curve K N/A	Sag Vertical Curve K 17 ₂₀ 136 136	YESYES
	Crest Vertical Curve K 216	Creek Vertical Curve K NA 151 151	NO NO
	Horizontal SSD 470 ⁽⁴⁾		
	Vertical SSD 683	Herizontal SSD 200° (n) 570° 570°	YESYES
	Pavement Cross Slope 2%	Vertical SSD 116°m 570° 570°	YESYES
	Superelevation 6%	Pavement Cross Slope 2% 2% 2% 2%	NO NO
	Vertical Clearance 15-7"	Superviscos 0.04 0.04 0.04	NONO
	Horizontal Clearance 10'-0'	Vertical Clearance NA NA NA NA	NA
	Listed below are the known non-complying items not requiring at (1) The AASHTO STD, as & relates to the design speed should be eq.	Maniputal Clarence NA NA NA NA	
	 I ne AASHTO STD as it reases to the design speed should be ed posted speed or the minimum "Greenbook" value for design speed (2) if design speed is less than the posted or statutory speed, a design 	Honzontal Clearance NA NA NA NA Bold items above are the known non-complying items not requiring an approved desi	NA
	(5) Structure Congra responsibly for some the type their checked for for (4) APP decorated suppose yell define measurer from the congra- cion of the congra- cion of the congra- duated median business. This is all certainty consistency of design.	(1) The AASITO-STE are of others the flowing period should be regale and higher of the point of the flowing method. It was the flowing method are formations of the flowing method are flower in the flowing method. (2) If flowings uponed a low that the provided or materies quest, alongs exception is required to the flowing method of the flower of the flowing of the flower of the flowing of the f	ther the
			秦

Some key differences in SRT Guidelines that affect design criteria:

- Uses current traffic instead of design year traffic for lane width and shoulder width
- Allows for a reduction of 10 mph for horizontal curve radius
- Allows for a reduction of 20 mph for vertical alignment K values and SSD
- Bridge width is reduced

Differences for Sub Regional Tier Checklist:

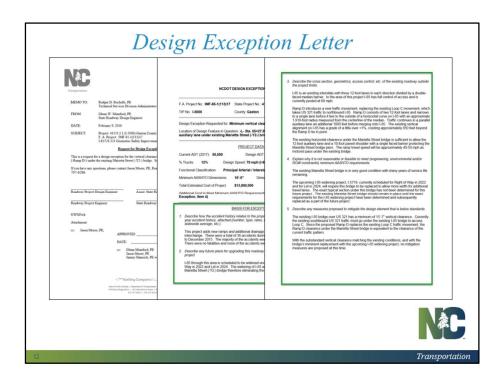
- Additional Column for Sub Regional Tier Values
- The "Exception Required" column must have two sets of responses

Note the use of subscripts that correspond to notes under the "non-complying" design elements.

DESIGN EXCEPTION PROCESS	DESIGN EXCEPTION PROCESS CHECKLIST	
Date: February 9, 2016. Project II TIP No. 1-5000. Functional Class Posted Speed 60 mph (1-85). Functional Class		
Bennus requires formal approval Priso Delegal AAS Design flower? Leve Worth 12: Design flower? Shouldow Worth 14: Design flower? Shouldow Worth 15: Design flower? Foreign Committee 15: Design flower? Foreign Committee 15: Design flower? Foreign Committee 15: Design flower? Shouldow Committee 15: Design flower? Foreign Committee 15: Design flower flower. (1) The Add The State flower flower flower flower flower flower. (2) Shouldow Company is repossible flower. This is an entire provided or design flower.	In the company of the	

A column is added to show the AASHTO Standards for the new design speed that is requested.

Like the Sub Regional Tier Checklist there will be two sets of YES/NO responses for each element.



Three Components of Design Exception Letter: Cover Letter

Basic Project Information including:

Elements Requiring Exception Traffic Classification Costs

Basis for Exception

Five Key Questions

	y relates to the proposed design exception. See current 3- number, type, rates, severity, cause, comparison to
F.A. Project No.: IMF-85-1(13)17 State Project No.: 41163.1.1 TIP No.: 1-6000 County: Gaston	currently posted at 60 mph. Ramp D introduces a new traffic movement, replacing the existing Loop. C movement, which takes U.S.211 that for northboard 1-65. Ramp D consists of two 12.hoot times and names to a single larse before it tes to the outside of a horizontal curve on 1-65 with an approximate.
Describe any future plans for upgr project.	rading this roadway either at or in the vicinity of this
Current ADT (2017): 60,600 Design ADT (2037): 60,100 % Trucks: 12% Design Speed 70 mph (I-45) Posted Speed: 60 mph (I-4 Eunctional Classification Principal Arterial / Interstate	Explain why if a not manuscule or feasible to meet (engineering, environmental and/or ROW construints) minimum ASHTO requirements. The undertoo feasible Street Index is not encoded condition with manuscules of secret file.
	etrics, access control, etc. of the existing roadway outside
BASIS FOR EXCEPTION 1. Describe how the accident history relates to the proposed design exception. See current year accident history, attached (number, type, rates, seventy, cause, comparison to	Describe any measures preposed to mitigate the design element that is below standards. The existing 145 bridge over US 321 has a minimum of 19.7" vertical clearance. Currently the existing outfloored US 321 that made go unich the sizeling 1.55 bridge for access.
Explain why it is not reasonable ROW constraints) minimum AAS	or feasible to meet (engineering, environmental and/or SHTO requirements.
project. 1-85 firrough this area is scheduled to be widened under STIP 1-5719, scheduled for Right. Way in 2022 and Let in 2024. The widening of 1-85 will require the replacement of the Marietta Street (-Y2.) bridge therefore eliminating the basis of this design exception.	of
Describe any measures proposed	d to mitigate the design element that is below standards.

Discuss the 5 Questions in More Depth

- 1) Accident History: A 3 year Accident History <u>must</u> be requested from Traffic Safety.
- 2) Future Upgrades: Not limited to TIP project improvements
- 3) Existing Roadway Outside Project: Immediately adjacent to the project. Sets context for the project in relation to the surrounding area.
- 4) Explanation of justification for exception: Significant extension to project limits (usually bridge projects), excessive impacts to natural resources, significant right of way costs, inconsistent with the surrounding area.
- 5) Mitigation: Could be as simple as evaluating the conditions once new facility is in operation.

Important Points To Remember

- A Design Exception Checklist should be completed for every project.
- Not every situation requires a formal Design Exception letter.
- Discuss the need for an exception early in project development.
- The basis for the exception must clearly show why the design standards cannot be met.



Bullet 1: Keep in Project File

Bullet 2: Things such as guardrail length of need reduction - document with note to file.

Bullet 4: Description of justification for the exception needs to be documented in detail.

