



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

ROADWAY DESIGN DIVISION
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DESIGN EXCEPTION REQUEST AND JUSTIFICATION FORM

TO: Katherine J. Lloyd, Director, Roadway Design Division, TDOT

FROM:  Frederick M. Miller, Assistant Director, Roadway Design Division

DATE: September 2, 2014

SUBJECT: Design Exception Request

Project No. HPP-71(16), 78008-1244-14
PIN No. 104959.01
Project Description: SR-71 (US-441), From SR-35/338 (US-411) to Macon Lane, Sevier County

CONTROLLING CRITERIA FOR WHICH EXCEPTION IS REQUESTED:

Design Speed	<input type="checkbox"/>	Lane Width	<input type="checkbox"/>	Shoulder Width	<input type="checkbox"/>	Grades	<input type="checkbox"/>
Horizontal Alignment	<input type="checkbox"/>	Vertical Alignment	<input checked="" type="checkbox"/>	Cross Slopes	<input type="checkbox"/>		
Stopping Sight Distance	<input type="checkbox"/>	Superelevation	<input type="checkbox"/>	Bridge Width	<input type="checkbox"/>		
Horizontal Clearance (other than clear zone)	<input type="checkbox"/>	Vertical Clearance	<input type="checkbox"/>	Structural Capacity	<input type="checkbox"/>		

DESIGN EXCEPTION REQUESTED:

Vertical alignment (sag curve) less than 45 mph.

DESIGN DATA:

Highway Functional Classification:	<u>Arterial</u>
Standard for the Above Classification:	<u>RD01-TS-3C</u>
Existing Posted Speed:	<u>45 mph</u>
Proposed Posted Speed:	<u>45 mph</u>
Type of Terrain:	<u>Rolling</u>
Rural or Urban Area:	<u>Urban</u>
Traffic Data: ADT (2014): <u>34,160</u>	D: <u>70-30</u>
ADT (2034): <u>67,860</u>	T: <u>2 %</u>
DHV: <u>6,150</u>	V: <u>1 %</u>

DESIGN FEATURES:

	Standard	Existing	Proposed	N/A
Cross Slope:	_____	_____	_____	<input checked="" type="checkbox"/>
Superelevation:	_____	_____	_____	<input checked="" type="checkbox"/>
Minimum Radius of Curve:	_____	_____	_____	<input checked="" type="checkbox"/>
Minimum Stopping Sight Distance:	_____	_____	_____	<input checked="" type="checkbox"/>
Minimum "K" Value for Crest Vertical Curve:	_____	_____	_____	<input checked="" type="checkbox"/>
Minimum "K" Value for Sag Vertical Curve:	<u>79</u>	<u>40</u>	<u>40</u>	<input type="checkbox"/>
Maximum Grade:	_____	_____	_____	<input checked="" type="checkbox"/>

ROADWAY TYPICAL SECTION:

	Standard	Existing	Proposed	N/A
Horizontal Clearance: (other than the clear zone)	_____	_____	_____	<input checked="" type="checkbox"/>
Shoulder Widths:	_____	_____	_____	<input checked="" type="checkbox"/>
Outside Shoulders:	_____	_____	_____	<input checked="" type="checkbox"/>
Inside Shoulders:	_____	_____	_____	<input checked="" type="checkbox"/>
Lane Width:	_____	_____	_____	<input checked="" type="checkbox"/>

BRIDGE FEATURES:

	Standard	Existing	Proposed	N/A
Traffic Lane Widths:	_____	_____	_____	<input checked="" type="checkbox"/>
Outside Shoulder Widths:	_____	_____	_____	<input checked="" type="checkbox"/>
Inside Shoulder Widths:	_____	_____	_____	<input checked="" type="checkbox"/>
Load Capacity or Sufficiency Rating:	_____	_____	_____	<input checked="" type="checkbox"/>
Vertical Clearance	_____	_____	_____	<input checked="" type="checkbox"/>
To Waterway:	_____	_____	_____	<input checked="" type="checkbox"/>
To Other Highway:	_____	_____	_____	<input checked="" type="checkbox"/>
To Railroad:	_____	_____	_____	<input checked="" type="checkbox"/>

FACTORS CONSIDERED:

1) Accident experience or data

Data Available ☐ No Data Available ☒ Not Applicable ☐

There is no data to indicate whether the lower design speed on the vertical sag curve has an effect on accidents.

2) Effect of the variance from the design standards on safety and operation of the facility

Effect considered ☒ No effect on the facility ☐ Not Applicable ☐

The design exception for the proposed vertical curve is a result of matching the existing profile, so there should be no effects on the safety and operation of vehicles.

3) Safety mitigation measures considered and provided

Measures provided ☒ Measures not justified ☐ Not Applicable ☐

A center turn lane will be added through this section as well as improved shoulders (4' width).

4) Compatibility of the design and operation with adjacent sections

Considered ☒ Not a Consideration ☐ Not Applicable ☐

The proposed typical section will match adjacent sections of SR-71.

5) Comparative cost of the full standard versus the lower design proposed

Considered ☒ Not a Consideration ☐ Not Applicable ☐

Right-of-way and construction costs were considered when determining a design solution.

6) Long term effect of the reduced design as compared to the full standard

Considered ☒ Not a Consideration ☐ Not Applicable ☐

Proposed vertical curve will be matching the existing vertical curve so no long term effect is anticipated.

7) Difficulty obtaining the full standard such as right-of-way restriction, environmental impacts, etc.

Considered ☒ Not a Consideration ☐ Not Applicable ☐

Full standard in the vertical curve would raise the grade approximately 10 feet and would have a significant effect on constructability.

8) Capacity reductions or operational reductions caused by the design

Considered ☒ Not a Consideration ☐ Not Applicable ☐

The design exception should not reduce the capacity or operability of the roadway.

9) Level of service for the full standard versus the proposed design

Considered ☒ Not a Consideration ☐ Not Applicable ☐

No change in level of service is anticipated.

10) Cumulative effect of more than one standard that is being reduced

Considered ☐ Not a Consideration ☐ Not Applicable ☒

N/A

11) Possibility of improving or achieving the full standard feature in the future

Applicable ☐ Not Applicable ☒ Not on the state highway system ☐

DESIGN EXCEPTION AND JUSTIFICATION:

The purpose of the project is to improve the safety of this 1.2 mile section of SR-71 (Chapman Highway) by adding a center turn lane and by lowering the crest of the hill approximately 5 feet for improved sight distance. The addition of the center turn lane will also improve the flow of traffic and provide route continuity along this highway. Four foot wide shoulders will be added on the outside along with curb and gutters and sidewalks. The design speed is 45 mph.

A design exception is required for the sag vertical curve at station 202+46. The existing vertical curve is a 30 mph design ($K=40$). For a 45 mph sag vertical curve, $K=79$. The proposed vertical curve will be matching the existing 30 mph curve ($K=40$).

In order to bring this vertical curve up to a 45 mph design, the vertical curve length must be lengthened from 400' to 823'. The profile would be raised up to 10 feet at the sag point. This would create a constructability issue under the current design. A runaround would be added to the plans because there is a commitment to maintain 2 lanes of traffic in each direction during construction. Displacements to a few structures would be added to the plans as well as additional environmental permit issues.

As there are no known safety issues with the vertical alignment at this location, and with numerous impacts of a change to a 45 mph vertical curve, we request approval of this design exception.

ATTACHMENTS:

Set of preliminary ROW plans

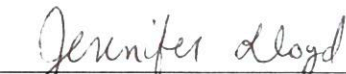
DESIGN EXCEPTION IS RECOMMENDED FOR APPROVAL BY:

9-5-14

Regional Project Development Director

☐ Comments Attached

APPROVED:



Director, Roadway Design Division, TDOT

9-10-14

Date