Submitted By: Chris Lacy Date: 3 / 14 / 23 Recommended: Chris Lacy Date: 3 / 14 / 23

Engineer of Record

To: Brian Klauk

Program / Project Manager

BASIS OF DESIGN EXCEPTION

☐ Request for Approval of Design Exceptions to AASHTO Guidelines

■ Request for Approval of Design Exceptions from Standard SCDOT Procedures

PROJECT CHARACTERISTICS

County: Richland and Lexington Rd./Route: I-20, 26, and 126 Const. Pin: P039720

From: MM 106 To: 110

Length: 4 miles MPO / COG: COATS

Work Type: Reconstruction of I-20, 26, 126 system interchanges

Functional Classification: Interstate

Group Designation: (1 ☐ / 2 ☐ / 3 ☐ / 4 ☐) (if applicable)

Type of Terrain: (Level ☐ / Rolling ■ / Mountainous ☐)

Design Speed: 60 (mph)

2020 ADT 140,000

2040 ADT 175,000

TRUCKS 5 %

CRASH ANALYSIS

(Attach additional sheets with accident history data)

TOTAL PROJECT ESTIMATE ($) 1.3B

CHECK APPROPRIATE BOX(ES) FOR DESIGN EXCEPTION(S)

- ☐ Design Speed
- ☐ Horizontal Alignment
  - ☐ Minimum Radii
- ☐ Vertical Alignment
  - ☐ Level SSD K-Values
- ☐ Maximum Grade
- ☐ Vertical Clearance
- ☐ Bridge Width
- ☐ Structural Capacity
- ☐ Superelevation Rate
- ☐ Cross Slope
  - ☐ Travel Lanes
  - ☐ Shoulders
- ☐ Travel Lane Width
- ■ Shoulder Width
- ☐ Horizontal Clearance
- ☐ Stopping Sight Distance

DESCRIBE ELEMENT(S) FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed)

DE for to provide a minimum 4' shoulder on the outside of "long bridges" and provide an additional 6' of shoulder width on the inside of curved long bridges. See Attachment A

JUSTIFICATION FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed)

See Attachment A

DESCRIBE STEPS TO ELEMINATE DESIGN EXCEPTION(S), INCLUDE COST

(Attach additional sheets as needed)

See Attachment A

HOW WILL FUTURE CONSTRUCTION IMPACT DESIGN EXCEPTION(S)?

(Attach additional sheets as needed)

See Attachment A

RECORD OF DECISION

☑ For	☐ For	☐ Approved
☐ Against	☐ Against	☐ Denied

_____ ___/___/____	_____ ___/___/____	_____ ___/___/____
(Regional Design Manager/ Program Manager / DEA) Date	(Regional Production Engineer) Date	(Director of Preconstruction) Date

☐ Concur

_____ ___/___/____

FHWA (NHS > $50 million & All Interstate)

cc:
Director of Preconstruction
FHWA
Preconstruction Support Engineer
Regional Production Group Engineer
District Engineering Administrator
Director of Traffic Engineering

Attachment A – Design Exception

Describe Elements for Design Exception:

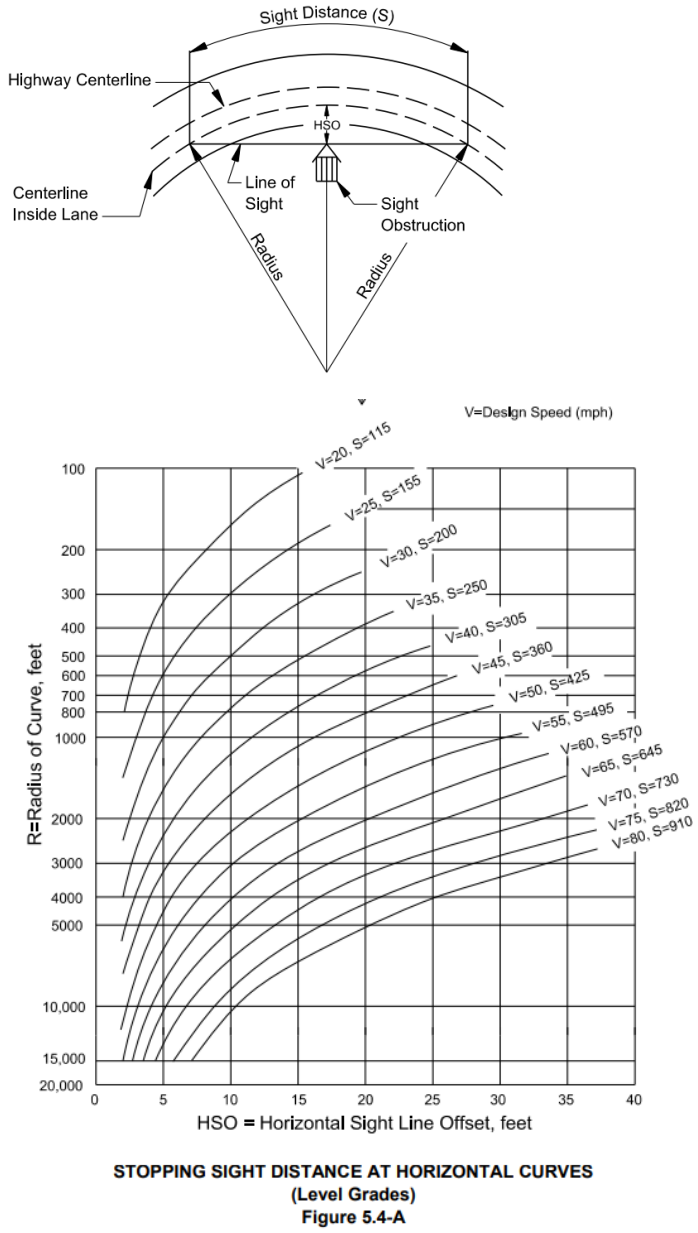
Ramp bridges that form connections to and from I-20, 26, and 126 would be reconstructed as part of the Carolina Crossroads project. AASHTO's *A Policy on Design Standards – Interstate System May 2016* allows bridges longer than 200' to utilize 4' shoulders. In order to provide sight distance on long curved bridges, this design exception allows the bridge to be striped with a 4' shoulder on the outside of the curve and add 6' of width to the inside of the curve for an inside shoulder width of 16'. The total available shoulder width on long bridges would be 20'.

Justification for Design Exception:

Ramp bridges that form connections to and from I-20, 26, and 126 would be reconstructed as part of the Carolina Crossroads project. These system to system ramps can be substantially longer than what currently exist due to collector distributor roads being constructed to facilitate traffic movement from interstate to interstate. The bridges required to span the roadway network including mainline lanes and CD roads will exceed 200' which is categorized by AASHTO as a long bridge. The design exception is requested to allow long ramp bridges to be striped such that the minimum shoulder width on the outside of long curved bridges may be reduced to 4' and the up to 6' may be added to the shoulder on the inside of the curve to provide additional sight distance. Allowing this design exception provides shoulders for stalled motorists, widths for passing stalled motorists, reduces excessively wide bridges which in turn reduces the costs of construction and maintenance.

Describe Steps to Eliminate Design Exception (include Costs):

The shoulder width on the outside of long curved ramp bridges would be constructed 10' wide and the shoulder width on the inside of the curve would need to be widened to provide the required stopping sight distance. The width would be dependent on the radius of the curve. The design speed of the ramps ranges from 45mph to 50mph depending on the classification of the ramp.



STOPPING SIGHT DISTANCE AT HORIZONTAL CURVES
(Level Grades)
Figure 5.4-A

How will future Construction Impact Design Exception?

This project is considered the ultimate build-out for the corridor. If additional lanes are required on the ramps, new bridges would be constructed and sight distance requirements would be reviewed at that time.

Submitted By: Chris Lacy Date: 3 / 14 / 23 Recommended: Chris Lacy Date: 3 / 14 / 23

Engineer of Record

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To: Brian Klauk

Program / Project Manager

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DESCRIBE ELEMENT(S) FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed)

DE to allow narrow shoulders at very limited locations (spot locations) to accommodate bridge foundations, hight mast lighting supports, and overhead sign supports. See Attachment A

JUSTIFICATION FOR DESIGN EXCEPTION(S)

(Attach additional sheets as needed)

See Attachment A

DESCRIBE STEPS TO ELEMINATE DESIGN EXCEPTION(S), INCLUDE COST

(Attach additional sheets as needed)

See Attachment A

HOW WILL FUTURE CONSTRUCTION IMPACT DESIGN EXCEPTION(S)?

(Attach additional sheets as needed)

See Attachment A

RECORD OF DECISION

☑ For	☐ For	☐ Approved
☐ Against	☐ Against	☐ Denied

_____ ___/___/____	_____ ___/___/____	_____ ___/___/____
(Regional Design Manager/ Program Manager / DEA) Date	(Regional Production Engineer) Date	(Director of Preconstruction) Date

☐ Concur

_____ ___/___/____

FHWA (NHS > $50 million & All Interstate)

cc:
Director of Preconstruction
FHWA
Preconstruction Support Engineer
Regional Production Group Engineer
District Engineering Administrator
Director of Traffic Engineering

Attachment A – Design Exception

Describe Elements for Design Exception:

The Carolina Crossroads Project consists of all work necessary to complete the design and reconstruction of new interchanges at I-20 with I-26, I-26 with I-126, St. Andrews Road (S-36) with I-26, and Bush River Road (S-273) with I-20 and associated interstate widening and ramp construction in Richland and Lexington Counties. Work will include design and construction of interstate widening, interchange ramps, collector-distributor roads, crossing routes, frontage roads, side roads, highway bridges, riverine bridges, railroad bridges, retaining walls, noise barrier wall, and related roadway appurtenances. Bridges along I-20, 26, and 126 within the project limits of Carolina Crossroads would be reconstructed as part of the Carolina Crossroads project. Service road overpasses may be retained as part of the design-build project. This design exception would allow narrow shoulders at very limited locations (spot locations) to accommodate bridge foundations, high mast lighting supports, and overhead sign supports that are constructed within the shoulder areas. Due to the location of the overhead structure support, the variance would be allowed in the inside shoulder and the outside shoulder depending on the element being protected by the roadside concrete barrier. I-20, 26, and 126 are multilane interstates that use concrete barrier to divide the directions of travel. The existing inside shoulder width along these routes are approximately 4.75' with some shoulders as narrow as 3.0'. The proposed inside shoulder width is 12' along I-26 and I-20 and 10' along I-126. The existing outside shoulders are 12' but due to additional lanes being added to the underpass, the future outside shoulder widths will be reduced. This design exception will allow shoulder width reductions at spot locations to be reduced to a minimum of 8' at these specific locations.

Justification for Design Exception:

The design exception is requested to allow spot locations where the shoulder would be less than AASHTO requirements (approximately 8’ at a minimum) but greater than the existing 4.75'. Stopping sight distance would still be provided per the contract documents for the design-build project.

Describe Steps to Eliminate Design Exception (include Costs):

To provide a 10' inside shoulder (AASHTO minimum), the crown point of I-20, 26, and 126 in both directions would need to be shifted approximately 2’. This would then result in deflections of the horizontal alignment and introduce curves or tapers into the mainline geometry which is undesirable. The span length would also increase in order to provide the necessary clear width. The cost to replace the overpasses at mile markers 101, 102, 103, 104, 106, 108, 63, and Browning Road overpass is estimated to be $104,000,000.

Other strategies such as reduction in lane width to provide shoulder width was ruled out due to the traffic volume and truck percentage. Providing 12’ lanes on the interstates is more desirable than narrowing the lane widths.

How will future Construction Impact Design Exception?

Due to constraints of roadside development along this corridor, this project is considered the ultimate build-out for the corridor and no future lanes are anticipated.