

August 16, 2021

Nebraska Department of Transportation  
Board of Public Roads Classifications and Standards  
P. O. Box 94759  
Lincoln, NE 68509

Attn: LeMoyne Schulz – Secretary

RE: Keya Paha County Project ER-1895(2)  
Control Number 81050  
Structure Number C007522105  
Bassett Northeast Bridge Replacement

Dear LeMoyne:

As Keya Paha County Highway Superintendent, I am requesting a relaxation of design standards to allow the 280' (STA. 22+88.00), 180' (STA 25+57.00), 320' (Carns Avenue STA 2+39.00), and 100' (Carns Avenue/Doc Middleton Road STA 4+62.00) vertical curves and a 500' radius horizontal curve (Carns Avenue/Doc Middleton Road STA 4+20.31) with 6% super elevation in the project alignments. I am also requesting a relaxation of the minimum design speed of 50 miles per hour to 40 miles per hour and a relaxation of the Chapter 2, Note 8 requirement for Rural Areas New and Reconstructed minimum design values for unpaved roads of 50 miles per hour to 40 miles per hour for the above referenced project.

The Carnes State Aid Bridge (Structure Number C007522105) spanning the Niobrara River was damaged in the March 2019 flood event. The south abutment, which included the back wall, wing walls and 100 feet of approach fill, washed away. The improvements for this emergency repair project would replace the previous bridge with an 850-foot long, 28 foot wide prestressed concrete girder bridge. The 28 foot width was chosen to allow for adequate clearance for large agricultural equipment.

The project begins approximately 700' south of the bridge location, and ends approximately 400' both East and West of the north intersection of the bridge and Doc Middleton Road. The project does not include any re-design or construction of the existing non-conforming curves to the south or the north of the bridge location.

The new roadway north and south of the river will be a 24-foot wide gravel surface with a 2-foot wide earth shoulder on each side. The updated bridge and the approximately 700' of reconstructed roadway south of the bridge would meet current design standards. The approach to the bridge on the north end, if designed to meet current design standards, would require a significant amount of realignment and additional fill which would encroach upon adjacent landowner property and structures (the second included Plan and Profile sheets shows the 50 miles per hour design of the roadway and the encroachment on the adjacent landowner's structure). Designing the roadway to the current standards would require the removal and replacement of at least one structure. This structure is a steel work building (approximate size 40' by 70') that is used by the rancher in his day-to-day operations. The grading for the 50 miles per hour design would also encroach upon the existing septic tank and leach field that services the residence on the property. A new septic tank and leach field would need to be installed. This is due to the fact that the existing alignment does not conform to the current design standards. The only possible way to avoid these issues is to relax the design standards and design for

a slower speed roadway. This is in good keeping with the actual nature of the existing roadway, as it is more of a scenic recreation roadway than a highly travelled vehicular corridor.

The following current design information applies to Carnes Avenue at this location:

National Functional Classification:	Major Collector
State Functional Classification:	Other Arterial
ADT: Carnes Ave. (Gravel)	35 (May-2020)
Surface:	Gravel
Existing Posted Speed Limit	50 MPH
Applicable Standards Table:	2-001.03H (Rural New and Reconstructed, 50 MPH)
Minimum Horizontal Curve Radius:	758 feet @ 8% Maximum Superelevation
Crest Vertical Curve K Value:	84
Sag Vertical Curve K Value:	96
Stopping Sight Distance:	425'

The proposed (relaxed) preliminary plan sheets (attached) show the horizontal and vertical curve data. The proposed radius of the horizontal curve is 500 feet. The proposed K value for the 280' vertical curve is 62.009, the proposed K value for the 180' vertical curve is 27.296, the proposed K value for the 320' vertical curve is 69.312, and the proposed K value for the 100' vertical curve is 45.335.

Also included are plan sheets that show the plan and profile if the roadway is designed to the current standards. The impacts to the adjacent property are readily apparent. Designing the roadway to the current standards would require the removal and replacement of at least one structure. This structure is a steel work building (approximate size 40' by 70') that is used by the rancher in his day-to-day operations. The grading for the 50 miles per hour design would also encroach upon the existing septic tank and leach field that services the residence on the property. A new septic tank and leach field would need to be installed.

We feel that the proposed alignment as shown on the enclosed proposed plan sheets with a reduced speed posting will best serve the requirements of this project. With regards to addressing the specific items required for the request for relaxation of standards:

004.01A1:

Attached is one copy of the Resolution of Adoption signed by the Keya Paha County Board of Commissioners.

004.01A2:

Attached is one copy of the completed **work/project information sheet**.

004.01A3:

The Project Identifiers are as follows and are included in the documents and plan set:

Keya Paha County Project ER-1895(2)  
Control Number 81050  
Structure Number C007522105

004.01A4:

Attached is a signed statement stating that the Nebraska Department of Transportation has reviewed and approved the current preliminary plan.

004.01A5:

Attached is one copy of the proposed construction plan sheet set and one copy of the plan and profile sheets if the roadway is designed to current standards.

004.01A6:

Attached is an aerial photograph showing the location and area of work.

004.01A7:

The applicable standards, State and National functional classifications, and type of work are as follows:

Applicable Standards:	Rural Area
National Functional Classification:	Major Collector
State Functional Classification:	Other Arterial
Type of Work:	Reconstructed

004.01A8:

The applicable State and National functional classification maps are attached.

004.01A9:

The applicable design data is as follows:

ADT: Carnes Ave. (Gravel)	35 (May-2020)
Surface:	Gravel
Existing Posted Speed Limit	50 MPH
Applicable Standards Table:	2-001.03H (New and Reconstructed, 50 MPH)
Proposed Posted Speed Limit:	40 MPH

004.01A10:

The table below summarizes the required and proposed design values for the requested relaxed non-standard design elements in this project:

			Proposed Non-Standard Design Elements				Comments
			K Value		Stopping Sight Distance		
STA	Type	L	Minimum	Proposed	Minimum	Proposed	
22+88.00	Crest	280'	84	62.009	425	324	North Bridge Approach
25+57.00	Sag	180'	96	27.296	425	324	Driveway (Begins in ROW)
2+39.00	Sag	320'	96	69.312	425	315	Carnes Ave./Doc Middleton Rd.
4+62.00	Crest	100'	84	45.335	425	315	Carnes Ave./Doc Middleton Rd.
4+20.31	Horizontal	504.24'	758'	500'			Horizontal Curve Radius-Carnes Ave.
Speed Limit			50 MPH	40 MPH			
Note 8			50 MPH	40MPH			

004.01A11:

The lowering of the speed limit through this section of roadway will only improve the safety of the roadway.

004.01A12:

A crash history report for the area under consideration was generated on the NTIP website. Please see the attached report. For the period from January 1st, 2010 to July 1st, 2021 there has been only one accident along the roadway. A serious injury crash occurred on Friday August 7, 2020. Alcohol use was a factor in the crash. In addition, the crash occurred due to the fact that the bridge was washed out.

004.01A13:

The cost estimate to achieve the full design standard (50 miles per hour) is presented below:

**Carnes Bridge**  
**Project No. ER-1895(2)**  
**Rock County & Keya Paha County, Nebraska**  
**M&A Project No. 163-P2-004 (50 MPH)**

Item No.	Item	Quantity	Unit	Unit Price	Total Price
<b>GRADING/GENERAL ITEMS</b>					
1	Mobilization	1.000	L.S.	40,000.00	40,000.00
2	Traffic Control	1.000	L.S.	4,500.00	4,500.00
3	Remove Existing Structure	1.000	L.S.	200,000.00	200,000.00
4	General Clearing & Grubbing	1.000	L.S.	16,000.00	16,000.00
5	Large Tree Removal	6.000	Each	1,000.00	6,000.00
6	Earthwork Measured In Embankment	21,683.000	C.Y.	9.00	195,147.00
7	Gravel Surfacing	355.000	Ton	40.00	14,200.00
8	4" Clay Subgrade Stabilization	537.000	C.Y.	15.00	8,055.00
9	Water	1,900.000	MGal	30.00	57,000.00
10	Construct Bridge Structure	24,000.000	S.F.	200.00	4,800,000.00
11	Temporary Work Platform	1.000	Each	800,000.00	800,000.00
12	Bank Protection	1.000	L.S.	500,000.00	500,000.00
13	Slope Protection	2,300.000	S.Y.	1.00	2,300.00
14	Slope Protection Mulch	2.000	Ton	250.00	500.00
15	Cover Crop Seeding	2.000	Acre	1,500.00	3,000.00
16	Type A Seeding	1.000	Acre	3,000.00	3,000.00
17	Type B Seeding	1.000	Acre	2,500.00	2,500.00
18	Mulch	4.000	Ton	250.00	1,000.00
19	Erosion Control Items				
	a) Fabric Silt Fence, Low Porosity	2,750.000	L.F.	3.00	8,250.00
	b) Silt Traps	1,560.000	L.F.	4.00	6,240.00
20	MGS Bridge Approach Section	4.000	Each	2,800.00	11,200.00
21	Guardrail End Treatment, Type 2	4.000	Each	2,800.00	11,200.00
22	Remove/Replace Building and Acquire ROW	1.000	L.S.	193,000.00	193,000.00
23	Replace Septic System and Utility Relocation	1.000	L.S.	25,000.00	25,000.00
<b>TOTAL ESTIMATED COST</b>					<b>6,908,092.00</b>

The total estimated cost for the Project if designed to the fifty mile per hour current design requirements would be \$6,908,092.00.

The cost estimate to achieve the relaxed design standard (40 miles per hour) is presented below:

**Carnes Bridge**  
**Project No. ER-1895(2)**  
**Rock County & Keya Paha County, Nebraska**  
**M&A Project No. 163-P2-004 (40 MPH)**

Item No.	Item	Quantity	Unit	Unit Price	Total Price
<b>GRADING/GENERAL ITEMS</b>					
1	Mobilization	1.000	L.S.	40,000.00	40,000.00
2	Traffic Control	1.000	L.S.	4,500.00	4,500.00
3	Remove Existing Structure	1.000	L.S.	200,000.00	200,000.00
4	General Clearing & Grubbing	1.000	L.S.	16,000.00	16,000.00
5	Large Tree Removal	6.000	Each	1,000.00	6,000.00
6	Earthwork Measured In Embankment	14,524.000	C.Y.	9.00	130,716.00
7	Gravel Surfacing	315.000	Ton	40.00	12,600.00
8	4" Clay Subgrade Stabilization	477.000	C.Y.	15.00	7,155.00
9	Water	1,800.000	MGal	30.00	54,000.00
10	Construct Bridge Structure	24,000.000	S.F.	200.00	4,800,000.00
11	Temporary Work Platform	1.000	Each	800,000.00	800,000.00
12	Bank Protection	1.000	L.S.	500,000.00	500,000.00
13	Slope Protection	2,300.000	S.Y.	1.00	2,300.00
14	Slope Protection Mulch	2.000	Ton	250.00	500.00
15	Cover Crop Seeding	2.000	Acre	1,500.00	3,000.00
16	Type A Seeding	1.000	Acre	3,000.00	3,000.00
17	Type B Seeding	1.000	Acre	2,500.00	2,500.00
18	Mulch	4.000	Ton	250.00	1,000.00
19	Erosion Control Items				
	a) Fabric Silt Fence, Low Porosity	2,750.000	L.F.	3.00	8,250.00
	b) Silt Traps	1,560.000	L.F.	4.00	6,240.00
20	MGS Bridge Approach Section	4.000	Each	2,800.00	11,200.00
21	Guardrail End Treatment, Type 2	4.000	Each	2,800.00	11,200.00
<b>TOTAL ESTIMATED COST</b>					<b>6,620,161.00</b>

The total estimated cost for the Project if designed to the relaxed forty mile per hour design requirements would be \$6,620,161.00. Thus, there is an added cost of \$287,931 to achieve the full design standard, due to the removal and replacement of the adjacent property owner's building and septic system, relocating utilities, acquiring additional ROW, and the additional construction materials for the longer roadway.

**004.01A14:**

Signing will be added to mitigate the effects of not meeting minimum design standards. There currently is a 35 mile per hour advisory sign on the north side of the bridge. Additional signs reading "T-Intersection, Blind" would be placed approximately 330' to the East and West of the north intersection of the bridge and Doc Middleton Road, and at the southern end of the bridge to inform drivers. A stop sign will be placed on the bridge leg of the intersection at the northern end of the bridge. The proposed

design speed limit is 40 miles per hour and the streets are designed to meet that standard. The anticipated posted speed limit will be 35 miles per hour, meeting the requirements of Note 8.

004.01A15:

No future improvements or work are proposed at this time to correct the substandard design.

004.01A16:

The environmental impacts are actually improved by relaxing the roadway design standards. Holding to the original design standards would require more fill, which could restrict the natural flow of storm water from the adjacent parcels. This would add additional cost to design and install culverts

004.01A17:

There are no other factors known affecting the relaxation.

004.01A18:

Attachments include the existing typical section and the proposed typical section.

I am enclosing a copy of the Resolution 21-14 showing approval by the Keya Paha County Board of Supervisors of this request, a Copy of the One- And Six-Year Form for this project, an aerial photo of the site, a summary of the accident history in the last 3 years for this immediate area, and a copy of preliminary plan sheets to assist the board members in their review.

Thank you for your consideration.

Sincerely yours,

Keya Paha County Highway Superintendent  
PO Box 50  
Valentine, NE 69201

## Request for Relaxation of Design Standards - Attachment

The Carnes State Aid Bridge (Structure Number C007522105) is a concrete arch bridge structure (with two steel truss bridge sections at the south end of the structure) which spans the Niobrara River in Keya Paha county. This structure is a low traffic count structure; the primary usage of the structure is for agricultural activities by farmers and ranchers in the vicinity and scenic activities. This structure was damaged in the March 2019 flood event. The south abutment, which included the back wall, wing walls and approximately 100 feet of approach fill, washed away. After assessing the damage to the structure, along with considerations of the age of the structure, the decision was made to replace the structure entirely.

Inspection of the existing bridge structure revealed a substantial amount of probable ice floe impact damage. Large ice floes are common in Nebraska rivers during the winter and early spring months. Early in the planning process it was determined that the bottom of the bridge deck would need to be three feet above the historical one hundred year flood water elevation. The Army Core of Engineers requires the bottom of bridge structures to be at least one foot above the historical one hundred year flood water elevation. It was determined that an additional two feet of elevation would be preferable to allow for the passage of ice floes in order to minimize the potential for future damage to the structure from ice. Once the design process got underway, however, it was determined that the slopes coming off the bridge were too steep, so the preferred two additional feet was decreased to one and a half feet to reduce the slopes.

Early in the planning process, meetings and conferences were held with potential project stakeholders. The Niobrara River north of Bassett is designated as a National Scenic River and falls under the purview of the National Park Service. The National Park Service requested that the bridge design utilize the longest spans possible between piers in order to minimize the number of piers in the water in order to minimize the impact on the environment, wildlife, and nature aficionados. This request compelled the bridge design to utilize prestressed reinforced concrete girders, as they are the most economical for long spans. Ultimately, the NU-1600 prestressed reinforced concrete girder type was chosen for the design. The height of an NU-1600 girder is approximately 5.25 feet.

The necessity of increasing the freeboard under the bridge to protect it from ice damage and the use of the NU-1600 prestressed reinforced concrete girder causes the design elevation of the bridge deck to be approximately 5 feet higher than the existing bridge deck. At the south end of the bridge, it is possible to meet the current roadway design standards while accommodating this change in elevation, due to the length and relative straightness of the approach. However, due to the short distance from the north end of the bridge to the intersection with Carns Avenue/Doc Middleton Road, as well as the fact that the existing Carns Avenue and Doc Middleton Road do not meet current design standards, it is much more difficult to integrate the new bridge deck elevation with the existing roadways on the north side of the bridge.

Redesigning and reconstructing Carns Avenue and Doc Middleton Road to the north of the bridge to meet current design standards for a 50 mile per hour roadway would require pushing the centerline of the existing curve where the two roads intersect approximately 80 feet north to meet the design required radius. It would also require adding approximately 6 feet of fill under portions of the two roadways. The additional fill directly impacts the cost of the project. In addition, the grading from the raised roadway would necessitate the removal of a structure on the adjacent landowner's property. This structure is a metal shop building (approximately 2,800 square feet in size). Also, the grading from the raised roadway would cover the existing septic system that services the existing residence on that same property. Therefore, a new septic system would need to be installed to service that residence.

The new building, new septic system, and incidental expenses associated with them, along with the additional fill would add approximately \$287,931.00 in cost to the project.

In addition to the added cost, the raised roadway would create a hardship on the adjacent property landowner. The raised roadway will considerably obscure the vistas and scenic nature of the river through his property. Also, adapting his driveways to the elevated roadway may make them less suitable for use in his ranching operation.

Due to the impacts to the project, the stakeholders, and the adjacent landowner, and the scenic attributes and low traffic counts on these roadways, we feel a relaxation of the current design standards to a 40 mile per hour design is warranted.