

# Benne Road Curve Realignment

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Sponsor County Highway

Project No. RB22-000008

Project Type Safety

## TOTAL FUNDING

Total	County	Sponsor	Federal	Other
<b>\$840,000.00</b>	<b>\$840,000.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>

## Project Description

Benne Road has two sharp horizontal curves that have seen a lot of run off the road crashes over the last year. There were 5 reported crashes in 2020 alone. Also, the intersection with Huffmeier Road, right at Route D, makes for an unconventional and dangerous intersection that needs to be improved. The plan would be to soften both of the sharp curves on Benne Road, add 6' wide shoulders to allow for a more forgiving pavement, and modify the intersection with Huffmeier Road to provide more separation from Route D. The intersection with Route D could be squared up better as well.



# Road Board Application

## PROJECT INFORMATION

Permit #: RB22-000008  
 Name: Benne Road Curve Realignment  
 Limits: From Route D to 0.46 miles east  
 Lane Miles: 0.92  
 Federal Functional Classification: 5 - Local  
 Anticipated useful life of the proposed improvements (years): 20  
 Project Type: Safety  
 Estimated date of completion: 12/31/2025  
**Safety Information**  
 Traffic Volume ADT: Existing 920 Future 1500  
 Crashes last 3 years: Total crashes 6 Fatal 0 Serious injury 3 Damage Only 3

Anticipated Crash Reduction Factor: 0.465

Crash Modification Factor (CMF)	Crash Type	No. of Crashes
CMF 1 #10264- H Radius = 0.874	Run off road	5
CMF 2 #9830- Edge Rumble = 0.75	Run off road	5
CMF 3 #5402- Pave Shldr = 0.71	Run off road	5

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## CONTACT INFORMATION

Sponsoring Agency: St. Charles County Highway Department  
 Contact Person Name: Chris Bostic  
 Title:  
 Telephone Number: (636) 949-7305  
 E-mail Address: cbostic@sccmo.org

## SIGNATURE

signature

3/29/22

date



**ST. CHARLES  
COUNTY**  
HIGHWAY  
DEPARTMENT

**BENNE ROAD PROJECT**  
FROM ROUTE D TO 0.46 MILES EAST  
THROUGH THE TWO SHARP TURNS ON BENNE RD  
PROJECT LENGTH: 0.46 MILES

  
**NORTH**  
NOT TO SCALE

ST. CHARLES COUNTY ROAD BOARD  
 2023 - 2025 TIP FINANCIAL WORKSHEET  
 BENNE ROAD

<b>FUNDING FOR IMPROVEMENTS</b>					
	County	Sponsor	Federal	Other	Total
Design	\$75,000.00	\$0.00	\$0.00	\$0.00	<b>\$75,000.00</b>
Utility Relocations	\$25,000.00	\$0.00	\$0.00	\$0.00	<b>\$25,000.00</b>
Right-of-Way	\$100,000.00	\$0.00	\$0.00	\$0.00	<b>\$100,000.00</b>
Construction	\$640,000.00	\$0.00	\$0.00	\$0.00	<b>\$640,000.00</b>
<b>TOTAL</b>	<b>\$840,000.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$0.00</b>	<b>\$840,000.00</b>
PERCENT (%)	100.00%	0.00%	0.00%	0.00%	100.00%
<b>FINANCIAL PLAN</b>					
Design	County	Sponsor	Federal	Other	Total
2023	\$75,000.00				\$75,000.00
2024					\$0.00
2025					\$0.00
Utility Relocations	County	Sponsor	Federal	Other	Total
2023					\$0.00
2024	\$25,000.00				\$25,000.00
2025					\$0.00
Right-of-Way	County	Sponsor	Federal	Other	Total
2023					\$0.00
2024	\$100,000.00				\$100,000.00
2025					\$0.00
Construction	County	Sponsor	Federal	Other	Total
2023					\$0.00
2024					\$0.00
2025	\$640,000.00				\$640,000.00

## Estimate of Project Costs

**Project Sponsor:** Saint Charles County Highway Department

**Project Title:** Benne Road

**Date:** 3/15/2022

### Specific Roadway Items

Item	Quantity	Unit	Unit Price	Amount
Clearing and Grubbing	1	Lump Sum	\$ 10,000.00	\$10,000.00
Removal of Improvements	1	Lump Sum	\$ 15,000.00	\$15,000.00
Mobilization	1	Lump Sum	\$ 30,000.00	\$30,000.00
Surveying	1	Lump Sum	\$ 10,000.00	\$10,000.00
Earthwork	5000	Cubic Yards	\$ 12.00	\$60,000.00
Retaining Walls	0	Square Feet	\$ 25.00	\$0.00
4" Aggregate Base	6700	Square Yards	\$ 6.00	\$40,200.00
Widened Pavement: Lane widening to 12' lanes, 6' shoulders	1900	Square Yards	\$ 40.00	\$76,000.00
Full Depth New Pavement: 2-12' lanes, 6' shoulders	4800	Square Yards	\$ 40.00	\$192,000.00
Driveways/Side street	400	Square Yards	\$ 35.00	\$14,000.00
Curb and Gutter	0	Linear Feet	\$ 20.00	\$0.00
Box Culvert	0	Lump Sum	\$ 50,000.00	\$0.00
Crossroad Drainage	1	Lump Sum	\$ 20,000.00	\$20,000.00
Traffic Control	1	Lump Sum	\$ 15,000.00	\$15,000.00
Roundabout/Signal	0	Each	\$ 200,000.00	\$0.00
Erosion Control	1	Lump Sum	\$ 7,500.00	\$7,500.00
Temporary Pavement	200	Square Yards	\$ 30.00	\$6,000.00
Sodding	0	Square Yards	\$ 5.00	\$0.00
Seeding	2.2	Acres	\$ 4,000.00	\$8,800.00
Pavement Markings	4800	Linear Feet	\$ 1.00	\$4,800.00
				\$0.00
<b>SUBTOTAL:</b>				<b>\$509,300.00</b>

### Specific Bicycle Items

Item	Quantity	Unit	Unit Price	Amount
				\$0.00
				\$0.00
<b>SUBTOTAL:</b>				<b>\$0.00</b>

<b>Specific Pedestrian Items</b>				
<b>Item</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Amount</b>
5 Foot Wide Sidewalks	0	Square Yards	\$ 40.00	\$0.00
10 Foot Wide Multi-Use Path	0	Square Yards	\$ 18.00	\$0.00
				\$0.00
				\$0.00
				\$0.00
				\$0.00
<b>SUBTOTAL:</b>				<b>\$0.00</b>

<b>Specific Transit Items</b>				
<b>Item</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Amount</b>
				\$0.00
<b>SUBTOTAL:</b>				<b>\$0.00</b>

<b>Miscellaneous Other Items</b>				
<b>Item</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Amount</b>
Utility Relocations	1	Lump Sum	\$25,000.00	\$25,000.00
				\$0.00
				\$0.00
				\$0.00
<b>SUBTOTAL:</b>				<b>\$25,000.00</b>

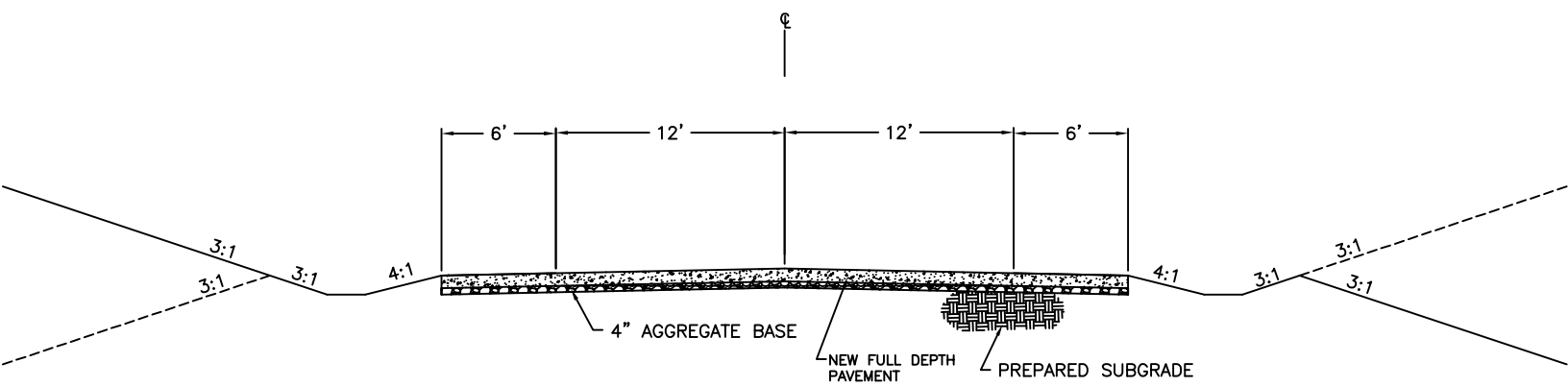
<b>Construction Cost Total:</b>	<b>\$534,300.00</b>
<b>Contingency (20%):</b>	<b>\$106,860.00</b>
<b>Inflation (4%):</b>	<b>\$21,380.00</b>
<b>Preliminary Engineering:</b>	<b>\$75,000.00</b>
<b>Right-of-Way:</b>	<b>\$100,000.00</b>
<b>Project Total (rounded):</b>	<b>\$840,000.00</b>

Benne Rd

<i>Project Schedule</i>	<i>Start Date (MO/YR)</i>	<i>Finish Date (MO/YR)</i>
Receive Notification of Funding	11/22	11/22
Consultant Selection	12/22	1/23
Award Engineering Services Contract	1/23	1/23
Obtain Environmental Clearances	1/23	5/24
Public Meeting/Hearing	9/23	9/23
Develop and Submit Preliminary Plans	1/23	9/23
Preliminary Plans Approved	10/23	11/23
Develop and Submit Right-of-Way Plans	12/23	3/24
Review and Approval of Right-of-Way Plans	3/24	4/24
Submit and Receive Approval for Notice to Proceed for Right-of-Way Acquisition (A-Date)	4/24	5/24
Right-of-Way Acquisition	5/24	11/24
Utility Coordination	1/23	11/24
Develop and Submit PS&E	7/24	10/24
District Approval of PS&E/Advertise for Bids	11/24	12/24
Submit and Receive Bids for Review and Approval	1/25	2/25
Project Implementation/Construction	3/25	12/25

BENNE ROAD  
TYPICAL SECTION

50' RIGHT-OF-WAY  
(2 - 12' LANES  
2 - 6' SHOULDERS)







# CRASH MODIFICATION FACTORS CLEARINGHOUSE

## CMF / CRF DETAILS

CMF ID: 10264

### CHANGE HORIZONTAL CURVE RADIUS FROM X TO Y (FEET)

DESCRIPTION:

PRIOR CONDITION: HORIZONTAL CURVE RADIUS OF X FEET

CATEGORY: ALIGNMENT

STUDY: STUDY ON MOTORCYCLE SAFETY IN NEGOTIATION WITH HORIZONTAL CURVES IN FLORIDA AND DEVELOPMENT OF CRASH MODIFICATION FACTORS, WANG ET AL., 20

Star Quality Rating: 5.0000 [\[VIEW SCORE DETAILS\]](#)

Rating Points Total: 80

#### Crash Modification Factor (CMF)

$$CMF = \frac{\left(\frac{Y}{5000}\right)^{-0.208}}{\left(\frac{X}{5000}\right)^{-0.208}}$$

Value:

= 0.874

Y = proposed horizontal curve radius, in feet

X = existing horizontal curve radius, in feet

Adjusted Standard Error:

Unadjusted Standard Error:

#### Crash Reduction Factor (CRF)

$$CRF = 100 * \left(1 - \frac{\left(\frac{Y}{5000}\right)^{-0.208}}{\left(\frac{X}{5000}\right)^{-0.208}}\right)$$

Value:

Y = proposed horizontal curve radius, in feet

X = existing horizontal curve radius, in feet

Adjusted Standard Error:

Unadjusted Standard Error:

Applicability

Crash Type: Other

**Crash Severity:** All**Roadway Types:** Not specified**Number of Lanes:** 2**Road Division Type:** Undivided**Speed Limit:****Area Type:** Rural**Traffic Volume:** Minimum of 460 to Maximum of 25180 Annual Average Daily Traffic (AADT)**Average Traffic Volume:** 4269 Annual Average Daily Traffic (AADT)**Time of Day:** All***If countermeasure is intersection-based*****Intersection Type:****Intersection Geometry:****Traffic Control:****Major Road Traffic Volume:****Minor Road Traffic Volume:****Average Major Road Volume :****Average Minor Road Volume :****Development Details****Date Range of Data Used:** 2005 to 2015**Municipality:****State:** FL**Country:** USA**Type of Methodology Used:** 7**Sample Size (crashes):** 439 crashes**Sample Size (miles):** 763 miles**Sample Size (mile-years):** 8393 mile-years**Other Details****Included in Highway Safety Manual?** No**Date Added to Clearinghouse:** Dec-07-2019**Comments:** This CMF applies to motorcycle-involved crashes on horizontal curves.[VIEW THE FULL STUDY DATA](#)[EXPORT DETAIL PAGE AS A PDF](#)



# CRASH MODIFICATION FACTORS CLEARINGHOUSE

## CMF / CRF DETAILS

CMF ID: 9830

### INSTALL EDGELINE RUMBLE STRIPS AT HORIZONTAL CURVE

DESCRIPTION: INSTALL EDGELINE RUMBLE STRIPS AT HORIZONTAL CURVE

PRIOR CONDITION: *NO PRIOR CONDITION(S)*

CATEGORY: ROADWAY

STUDY: [SAFETY EVALUATION OF EDGE-LINE RUMBLE STRIPES ON RURAL TWO-LANE HORIZONTAL CURVES, HIMES ET AL., 2017](#)

Star Quality Rating: [VIEW SCORE DETAILS]

Rating Points Total: 120

#### Crash Modification Factor (CMF)

Value: 0.75

Adjusted Standard Error:

Unadjusted Standard Error: 0.09

#### Crash Reduction Factor (CRF)

Value: 25 *(This value indicates a decrease in crashes)*

Adjusted Standard Error:

Unadjusted Standard Error: 9

#### Applicability

Crash Type: All

Crash Severity: All

Roadway Types: All

Number of Lanes: 2

Road Division Type: Undivided

Speed Limit:

Area Type: Rural

Traffic Volume: Minimum of 412 to Maximum of 4268 Annual Average Daily Traffic (AADT)

Average Traffic Volume: 1589 Annual Average Daily Traffic (AADT)

Time of Day: All

**If countermeasure is intersection-based****Intersection Type:****Intersection Geometry:****Traffic Control:****Major Road Traffic Volume:****Minor Road Traffic Volume:****Average Major Road Volume :****Average Minor Road Volume :****Development Details****Date Range of Data Used:** 2004 to 2012**Municipality:****State:** KY**Country:** USA**Type of Methodology Used:** 2**Sample Size (crashes):** 305 crashes before, 86 crashes after**Sample Size (miles):** 15.59 miles before, 15.59 miles after**Sample Size (miles):** 90.38 mile-years before, 34.36 mile-years after**Other Details****Included in Highway Safety Manual?** No**Date Added to Clearinghouse:** Oct-27-2018**Comments:** The CMF is for Total crashes (all types and severities combined).[VIEW THE FULL STUDY DATA](#)[EXPORT DETAIL PAGE AS A F](#)

This site is funded by the U.S. Department of Transportation Federal Highway Administration and maintained by the University of North Carolina Highway Safety Research Center.

For more information, contact Karen Scarry at [karen.scarry@dot.gov](mailto:karen.scarry@dot.gov)

The information contained in the Crash Modification Factors (CMF) Clearinghouse is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in the CMF Clearinghouse. The information contained in the CMF Clearinghouse does not constitute a standard, specification, or regulation, nor is it a substitute for sound engineering judgment.



# CRASH MODIFICATION FACTORS CLEARINGHOUSE

## CMF / CRF DETAILS

CMF ID: 5402

### UPGRADE NARROW UNPAVED SHOULDER (< 5 FT) TO WIDE UNPAVED SHOULDER (> 5 FT)

DESCRIPTION: UPGRADE NARROW UNPAVED SHOULDER (< 5 FT) TO WIDE UNPAVED SHOULDER (> 5 FT)

PRIOR CONDITION: NARROW UNPAVED SHOULDER (< 5 FT)

CATEGORY: SHOULDER TREATMENTS

STUDY: EVALUATION OF SAFETY EFFECTIVENESS OF COMPOSITE SHOULDERS, WIDE UNPAVED SHOULDERS, AND WIDE PAVED SHOULDERS IN KANSAS, ZENG ET AL., 2013

Star Quality Rating: [\[VIEW SCORE DETAILS\]](#)

Rating Points Total: 105

#### Crash Modification Factor (CMF)

Value: 0.71

Adjusted Standard Error:

Unadjusted Standard Error: 0.048

#### Crash Reduction Factor (CRF)

Value: 29 (This value indicates a decrease in crashes)

Adjusted Standard Error:

Unadjusted Standard Error: 4.8

#### Applicability

Crash Type: All

Crash Severity: All

Roadway Types: Major Collector

Number of Lanes: 2

Road Division Type: Undivided

Speed Limit:

Area Type: Rural

Traffic Volume: Minimum of 65 to Maximum of 4950 Annual Average Daily Traffic (AADT)

Average Traffic Volume:

Time of Day: All

If countermeasure is intersection-based

**Intersection Type:**

**Intersection Geometry:**

**Traffic Control:**

**Major Road Traffic Volume:**

**Minor Road Traffic Volume:**

**Average Major Road Volume :**

**Average Minor Road Volume :**

**Development Details**

**Date Range of Data Used:** 2000 to 2009

**Municipality:**

**State:** KS

**Country:** USA

**Type of Methodology Used:** 7

**Sample Size (crashes):** 3135 crashes

**Other Details**

**Included in Highway Safety Manual?** No

**Date Added to Clearinghouse:** Jan-09-2014

**Comments:** The cross sectional model compares narrow unpaved shoulders to wide unpaved shoulders. There are more crashes in the sample, specifically associated with the category "wide paved shoulders," that wasn't included in the summary st

[VIEW THE FULL STUDY DATA](#)

[EXPORT DETAIL PAGE AS A F](#)

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For more information, contact Karen Scurry at karen.scurry@dot.gov

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# St. Charles County Highway Dept.

301 N 3rd St  
St Charles, MO 63301  
(636) 949-7305

Benne Rd  
Near Route D  
Date Start: 3/16/2022  
Latitude: 38° 42.3571 North  
Longitude: 90° 49.9983 West  
Benne Rd Near Route D ADT 3-16-22

Start Time	Wed 3/16/2022		Thu 3/17/2022		Fri 3/18/2022		Daily Average		
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	*	14	0	*	*	*	0	14	
12:15	*	15	0	*	*	*	0	15	
12:30	*	18	1	*	*	*	1	18	
12:45	*	12	0	*	*	*	0	12	
01:00	*	10	2	*	*	*	2	10	
01:15	*	12	0	*	*	*	0	12	
01:30	*	10	0	*	*	*	0	10	
01:45	*	6	0	*	*	*	0	6	
02:00	*	18	0	*	*	*	0	18	
02:15	*	22	0	*	*	*	0	22	
02:30	*	18	0	*	*	*	0	18	
02:45	*	24	0	*	*	*	0	24	
03:00	*	20	0	*	*	*	0	20	
03:15	*	18	0	*	*	*	0	18	
03:30	*	18	1	*	*	*	1	18	
03:45	*	16	1	*	*	*	1	16	
04:00	*	17	0	*	*	*	0	17	
04:15	*	<b>16</b>	0	*	*	*	0	<b>16</b>	
04:30	*	<b>21</b>	0	*	*	*	0	<b>21</b>	
04:45	*	<b>23</b>	1	*	*	*	1	<b>23</b>	
05:00	*	<b>31</b>	3	*	*	*	3	<b>31</b>	
05:15	*	15	2	*	*	*	2	15	
05:30	*	17	2	*	*	*	2	17	
05:45	*	15	8	*	*	*	8	15	
06:00	*	13	8	*	*	*	8	13	
06:15	*	20	17	*	*	*	17	20	
06:30	*	18	22	*	*	*	22	18	
06:45	*	20	12	*	*	*	12	20	
07:00	*	8	<b>16</b>	*	*	*	<b>16</b>	8	
07:15	*	11	<b>16</b>	*	*	*	<b>16</b>	11	
07:30	*	8	<b>21</b>	*	*	*	<b>21</b>	8	
07:45	*	7	<b>29</b>	*	*	*	<b>29</b>	7	
08:00	*	11	12	*	*	*	12	11	
08:15	*	9	14	*	*	*	14	9	
08:30	*	11	18	*	*	*	18	11	
08:45	*	6	20	*	*	*	20	6	
09:00	<b>10</b>	3	1	*	*	*	6	3	
09:15	<b>12</b>	4	*	*	*	*	12	4	
09:30	<b>19</b>	2	*	*	*	*	19	2	
09:45	<b>13</b>	3	*	*	*	*	13	3	
10:00	10	2	*	*	*	*	10	2	
10:15	12	1	*	*	*	*	12	1	
10:30	8	1	*	*	*	*	8	1	
10:45	14	0	*	*	*	*	14	0	
11:00	6	1	*	*	*	*	6	1	
11:15	10	2	*	*	*	*	10	2	
11:30	2	1	*	*	*	*	2	1	
11:45	14	0	*	*	*	*	14	0	
Total	130	568	227	0	0	0	352	568	
Combined Total	698		227		0		920		
Peak	09:00	04:15	-	07:00	-	-	-	07:00	04:15
Vol.	54	91	-	82	-	-	-	82	91
P.H.F.	0.711	0.734	0.707				0.707	0.734	
ADT	ADT 920		AADT 920						

COUNTY HIGHWAY - BENNE ROAD  
CRASH DATA ANALYSIS

	Date	Address	Reason	# of injuries	Fatal	Serious Injury	Minor Injury	Property Damage
	<b>6</b>			<b>4</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>3</b>
1	5/31/2019	Benne Road	driver error	0				1
2	2/26/2020	Benne Road	driver error	0				1
3	7/25/2020	Benne Road	driver error	1		1		
4	7/30/2020	Benne Road	weather	0				1
5	8/28/2020	Benne Road	driver error	2			2	
6	10/18/2020	Benne Road	animal	1			1	