Billings Summary

1.0 – Introduction

On January 26, 2017 the Missouri Department of Transportation Multi-Modal Division commissioned CMT to perform a safety study of the BNSF Cherokee Subdivision line from M.P. 251 to M.P. 258 in Greene, Christian, and Lawrence counties. **Figure 1-1** illustrates the overview of the study along the Route 60 corridor from Republic, MO to Aurora, MO. The study was divided up into three different sections as illustrated below. This summary will focus on Section 2 that included the City of Billings, MO.

Figure 1-1
Overall Study Map

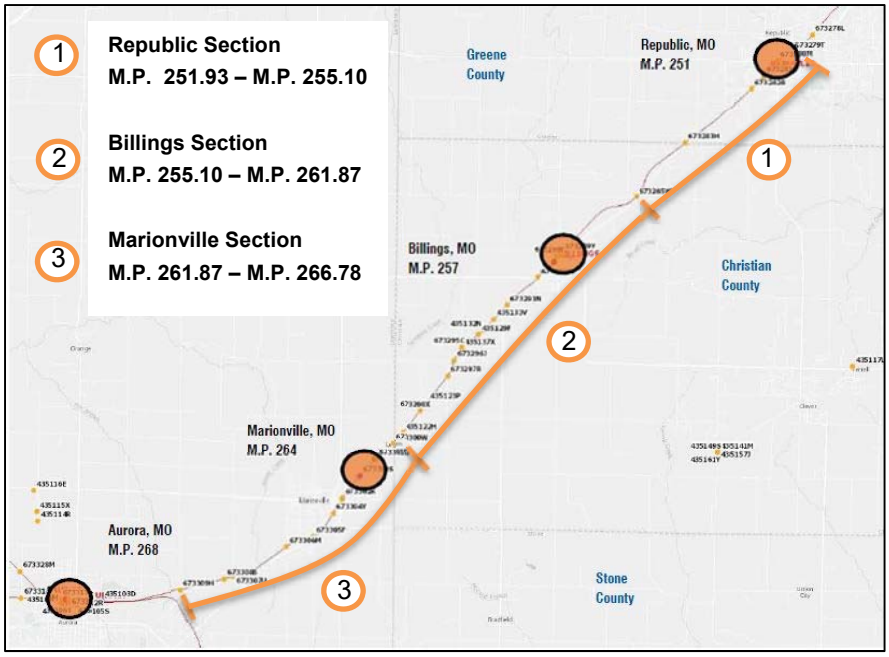


Figure 1-2 Billings Section Crossing Map

All at-grade railroad crossings within the City of Billings, including the surrounding areas were included in this section of the safety study as shown above. In all, eight (8) at-grade railroad crossings were included as part of the Billings section of the study as shown in **Figure 1-2** below.

Additionally, a table with the railroad at-grade crossing existing condition and accident statistics can be seen below in **Figure 1-3**.

MoDOT - BNFS RAILROAD (CHEROKEE SUB-DIVISION FROM M.P. 251 TO M.P. 268) AT-GRADE RAILROAD CROSSING SUMMARY											
	STREET	US DOT #	RR M.P.	WARNING DEVICES	RR SPEED	ROADWAY CLASSIFICATION	ROADWAY SPEED LIMIT	# OF TRAFFIC	CMT ADT	ACCIDENTS	INJURY STATUS	DATE
BILLINGS	Rose Hill Road	673285W	255.1	FL/GATES	50	LOCAL	45	2	628	2	Killed	2/4/1995
											Uninjured	7/23/1983
	Jefferson Avenue	673289Y	257.03	FL/GATES	50	LOCAL	30	2	661	0		
	Washington Avenue	673290T	257.15	FL/GATES	50	LOCAL	30	2	968	2	Uninjured	4/18/1994
											Uninjured	12/12/1986
	Mt. Vernon Road (RTE. 14)	673292G	257.73	FL/GATES	50	MAJOR COLLECTOR	30	2	706	1	Uninjured	4/11/2008
	Vermule Road	673295C	259.59	FL/GATES	50	LOCAL	45	2	76	1	Killed	8/13/2010
	Kastendieck Road	673296J	259.88	CROSSBUCKS	50	LOCAL	45	2	189			
	Lambeth Road	673297R	260.19	CROSSBUCKS	50	LOCAL	45	2	65	3	Killed	3/13/2016
											2-Injured	12/21/2007
											Injured	6/19/1999
	Aloe Road	673298X	261.00	CROSSBUCKS	40	LOCAL	40	1	45	1	2-Killed, 1-Injured	6/28/1991

Figure 1-3
At-Grade Crossing
Summary

2.0 – Jurisdictional Contacts and Limits

The Billings section of the Rail Crossing Safety Study includes crossings within the city limits of Billings, including a few crossings that are outside the city limits. Due to this, multiple different agencies have jurisdictional control of the various crossings in this study area. The Jurisdictional contact information can be found below in **Figure 2-1**. Additionally, **Figure 2-2** shows the crossings throughout the Billings section and the agency with jurisdictional control over them.

Figure 2-1
Jurisdictional
Contact Information

Contact Information				
Name	**Agency**	**Title**	**Phone Number**	**Email Address**
Michael Hodges	City of Billings	Mayor	417-744-2581	mayor@billingsmo.com
Ruth Haskins	City of Billings	City Clerk	417-744-2581	clerk@billingsmo.com
Randy Poindexter	City of Billings	Water & Sewer Supt.	417-744-2581	water-sewer@billingsmo.com
Mickey Brown	City of Billings	City Ward	417-838-1508	ward2a@billingsmo.com
David Taylor	City of BIllings	Police Chief	417-744-2582	policechief@billingsmo.com
Danny Garbee	Billings Road and Fire	Manager	417-880-9589	-
Miranda Beadles	Christian County	Road Engineer	417-582-4394	mbeadles@christiancountymo.gov
Brent Young	Christian County	Road Crew Supervisor	417-840-7514	-
Hosea Bilyeu	Christian County	Western Commissioner	417-582-4300	hbilyeu@christiancountymo.gov
Ralph Phillips	Christian County	Eastern Commissioner	417-582-4300	rphillips@chrstiancountymo.gov

Figure 2-2
Jurisdictional Control

At-Grade Crossing Jurisdictional Control			
Crossing	**M.P.**	**DOT#**	**Jurisdiction**
Rose Hill Road	255.1	673285W	Christian County / Billings Special Road District
Jefferson Avenue	257.03	673289Y	City of Billings / Billings Special Road District
Washington Avenue	257.15	673290T	City of Billings/ Billings Special Road District
Mt Vernon Rd. (RTE. 14)	257.73	673292G	MoDOT
Vermule Road	259.59	673259C	Christian County / Billings Special Road District
Kastendieck Road	259.88	673296J	Christian County / Billings Special Road District
Lambeth Road	260.19	673297R	Christian County / Billings Special Road District
Aloe Road	261.00	673298X	Christian County / Billings Special Road District

3.0 – Alternate Analysis

Multiple alternatives were developed as part of the study, many of which were generated by participants during the public work sessions. Feedback from the public engagement process was evaluated and reflected in the development of seven (7) different alternatives for analysis. During the study, these alternatives were continually modified based on feedback from the public, stakeholders, and city staff. Additonal documentation on the public engagment process can be found in Section 2 of the report. All the alternates were technically evaluated based on geometrics, safety, traffic, and public support. Below is a summary of the different alternatives and the supporting documentation that was performed as part of the alternative analysis. (See **Figure 3-1**)

Figure 3-1
Consolidation
Alternatives

BILLINGS SECTION AT-GRADE RAILROAD SAFETY STUDY CONSOLIDATION ALTERNATIVES											
Alternative Number	**Rose Hill Rd.**	**Jefferson Ave.**	**Washington Ave.**	**Mt. Vernon Rd. (Rte. 14)**	**Vermule Rd.**	**Kastendieck Rd.**	**Lambeth Rd.**	**Aloe Rd.**	**Closure Summary**	**Upgrade Summary**	**Cost**
1A	OP	OP	OP	OP	X	UPG	X	UPG	2 Total Closures	2 Total Upgrades	$2,903,767
1B	OP	OP	OP	OP	X	UPG	X	UPG	2 Total Closures	2 Total Upgrades	$2,197,768
1C	OP	OP	X	OP	X	UPG	X	UPG	3 Total Closures	2 Total Upgrades	$2,727,768
2	OP	OP	OP	OP	OP	UPG	X	UPG	1 Total Closure	2 Total Upgrades	$1,804,246
3	OP	OP	X	OP	X	UPG	X	UPG	3 Total Closures	2 Total Upgrades	$2,669,414
4	OP	OP	X	OP	OP	X	UPG	UPG	2 Total Closures	2 Total Upgrades	$1,638,558
5	OP	OP	OP	OP	OP	UPG	UPG	UPG	0 Total Closures	3 Total Upgrades	$1,143,116

3.1 Alternate Selection

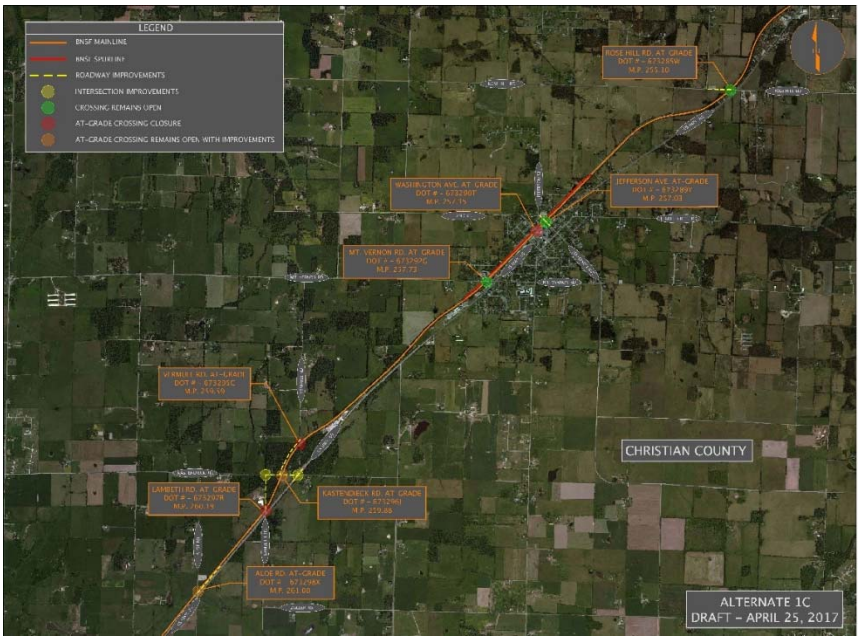
Although the public input played a major role in determining the final recommendation, each alternative was independently analyzed in order to determine which alternatives would provide the largest safety benefit. In order to determine which alternatives provided the largest safety benefit, the existing condition and accident history were both evaluated in order to determine an existing crash probablility.

A proposed crash probability was then developed for each crossing by taking into account the proposed improvements for each alternate. This quantitative approach provided the department with evaluation tools to compare the theoretical safety benefits to the anticipated costs of the improvements. More can be found regarding the cost benefit ratio in **Section 6** of this summary.

In conclusion, two alternates were chosen for a final recommendation to provide safety beneifts along the corridor.

3.1.1 Alternates for Final Recommendation

Figure 3-2
Alternate 1C



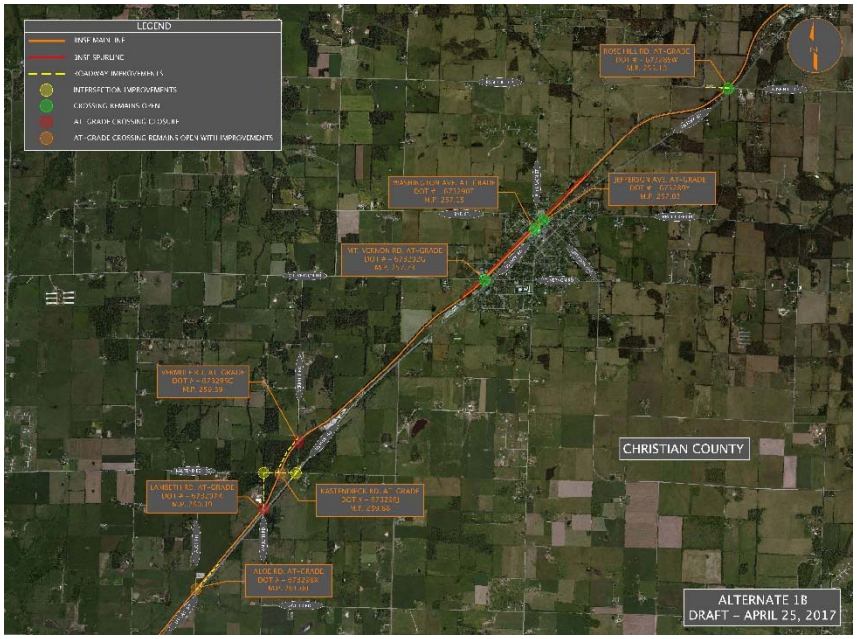
Rose Hill Rd.	Jefferson Ave.	Washington Ave.	Mt. Vernon Rd. (MO 14)	Vermule Rd.	Kastendieck Rd.	Lambeth Rd..	Aloe Rd.
OP	OP	X	OP	X	UPG	X	UPG

Alternates 1B & 1C both provide a significant safety benefit along the BNSF Railroad in the Billings Section.

The preferred alternative recommendation was Alternate 1C since it provides a significant safety benefit due to the closure of an additional crossing at Washington Ave. as shown in **Figure 3-2.** The additonal safety benefit comes with a higher price tag when compared to other alternates. The alternative results in a lower benefit cost ratio when compared to Alternative 1B, but it is believed the additional safety benefits outweigh the additonal costs. Additional details for this recommended alternative can be found in Section 4 of the Report.

During the study, Alternate 1C received a lack of support from the public due to the closure of Washington Ave despite the closure providing the safety benefit and close proximety to Jefferson Ave. The alternate also included an option of relocating the existing signal from Washington to Jefferson St. The relocation of the existing signal has been a priority for the City of Billings since the Casey's Gas Station moved from Washington Ave. to the Jefferson crossing intersection with US 60. Due to this lack of support, Alternate 1B has been chosen as the recommended alternate, given it's combination of public support and safety benefits.

Figure 3-3
Alternate 1B



Alternate 1B provides excellent safety benefits and results in a positive benefit cost ratio. Alternate 1B can be seen in **Figure 3-3** with additional details on the proposed improvements listed below in Section 4.

Rose Hill Rd.	Jefferson Ave.	Washington Ave.	Mt. Vernon Rd. (MO 14)	Vermule Rd.	Kastendieck Rd.	Lambeth Rd..	Aloe Rd.
OP	OP	OP	OP	X	UPG	X	UPG

4.0 - Summary of Improvements – Alternate 1B

Below is a summary of the improvements included in the recommended Alternative 1B. Additional narrative on existing conditions and determining factors that resulted in each of the proposed improvements can be found in Section 1 and Section 4 of the Report.

4.1 **DOT #673285W –** Rose Hill Rd. At-Grade crossing located at M.P. 255.10. No proposed improvements recommended to the existing warning device system. Roadway improvements near the crossing include roadway profile adjustment to improve sight distance on north side of railroad crossing.

4.2 **DOT #673289Y –** Jefferson Ave. At-Grade crossing located at M.P. 257.03. No proposed improvements at this crossing or to surrounding roadway system.

4.3 **DOT #673290T** – Washington Ave. At-Grade crossing located at M.P. 257.15. No proposed improvements at this crossing or to surrounding roadway system.

4.4 **DOT #673292G –** Mt. Vernon Rd. (MO 14) At-Grade crossing located at M.P. 257.73. No proposed improvements at this crossing or to surrounding roadway system.

4.5 **DOT #673295C –** Vermule Rd. At-Grade crossing located at M.P. 259.88. Proposed improvements at this crossing are: Permanent closure of at-grade crossing that include removal of existing crossing and adjacent roadway. Roadway improvements to accommodate the

closure include: a new two (2) lane road between Vermule and Kastendieck Rd. to provide connectivity.

4.6 **DOT #673296J –** Kastendieck Rd. At-Grade crossing located at M.P. 259.88. Proposed improvements for this crossing are: Upgrading warning devices from Crossbucks to Flashing Lights and Automatic Gates. Roadway improvements near the crossing include: roadway and intersection improvements at US 60 & Kastendieck to provide better geometrics. The improvements also include the addition of a westbound dedicated right turn lane on US 60 as well as a bi-directional EB left turn lane added on US 60.

4.7 **DOT #673297R –** Lambeth Rd. At-Grade crossing located at M.P. 260.19. Proposed improvements for this crossing are: Permanent closure of at-grade crossing that include removal of existing crossing and adjacent roadway. Roadway improvements to accommodate this closure are: roadway widening to both Kastendieck & Lambeth to accommodate additional truck traffic (detoured to Kastendieck as a result of the Lambeth Closure). New truck turnaround added to the new terminated leg of Lambeth intersection improvements at Kastendieck & Lambeth to accommodate truck traffic.

4.8 **DOT #673298X –** Aloe Rd. At-Grade crossing located at M.P. 261.00. Proposed improvements for this crossing are: Upgrading warning devices from Crossbucks to Flashing Lights nad Automatic Gates. Roadway improvements near this crossing are: a westbound dedicated right turn lane on US 60.

5.0 - Estimated Costs – Alternate 1B

Figure 5-1
Estimated Cost

A breakdown of estimated costs for the proposed improvements described in **Section 4.0** above can be seen in **Figure 5-1** below. A detailed breakdown of the costs associated with Alternate 1B is attached in **Appendix A**.

Alternate 1B Estimated Improvement Costs						
Location	**Railroad**	**Roadway**	**Right of Way**	**Utilities**	**Engineering**	**Total Cost**
Rose Hill Rd.	N/A	$162,498	N/A	N/A	$14,000.00	$176,498.00
Jefferson Ave.	No Improvements					
Washington Ave.	No Improvements					
Mt. Vernon Rd. (MO 14)	No Improvements					
Vermule Rd.	$30,000.00	$414,921.00	$20,000.00	$20,000.00	$36,500.00	$521,421.00
Kastendieck Rd.	$250,000.00	$546,908.00	$5,000.00	$60,000.00	$70,000.00	$931,908.00
Lambeth Ave.	$30,000.00	$325,524.00	$12,500.00	$10,000.00	$34,200.00	$412,224.00
Aloe Rd.	$250,000.00	$189,349.00	N/A	$10,000.00	$33,000.00	$482,349.00
					Total Improvement Cost	$2,524,400

6.0 – Cost Benefit Analysis

As part of the Railroad Study a cost-benefit analysis was performed to determine which alternative would provide the most benefit. In order to perform a cost benefit analysis, each crossing's safety benefits were determined by comparing the existing crash prediction modal versus the proposed crash prediction modal. The proposed crash prediction formula considered the proposed improvements (described in Section 4) for each at-grade crossing. The comparison of these two modals resulted in a theoretical safety benefit for each at-grade crossing. Based on this information the proposed costs for the improvements were valued against the theortical safety benefit. The Cost-Benefit for each alternative can be seen below in **Figure 6-1**. As shown in the table, the selected Alternate 1B, provided a positive benefit-cost ratio of all alternatives evaluated for this section.

Figure 6-1
Cost Benefit Analysis

MoDOT - BNSF RAILROAD (CHEROKEE SUB-DIVISION FROM M.P. 251 TO M.P. 268)													
BENEFIT-COST CROSSING ALTERNATE SUMMARY													
BILLINGS, MO - CHRISTIAN COUNTY													
	IMPROVEMENT COSTS	# CROSSING CLOSURES	# CROSSING UPGRADES		ROSE HILL B/C	JEFFERSON B/C	WASHINGTON B/C	MT. VERNON B/C	VERMULE B/C	KASTENDIECK B/C	LAMBETH B/C	ALOE B/C	AVG. BENEFIT-COST RATIO
ALT #1A	$ 2,903,766.94	2	2		N/A	N/A	N/A	N/A	0.25684551	0.398895617	3.38612929	0.24783	**1.072425028**
ALT #1B	$ 2,194,200.00	2	2		N/A	N/A	N/A	N/A	0.72774698	0.398895617	3.38612929	0.24783	**1.190150398**
ALT #1C	$ 2,844,200.00	3	2		N/A	N/A	0.057975699	N/A	0.72774698	0.398895617	3.38612929	0.24783	**0.963715458**
ALT #2	$ 1,804,246.04	1	2		N/A	N/A	N/A	N/A	N/A	0.398895617	3.38612929	0.24783	**1.344284869**
ALT #3	$ 2,181,481.94	3	2		N/A	N/A	0.204283235	N/A	0.72774698	0.398895617	3.38612929	0.24783	**0.992976965**
ALT #4	$ 1,138,557.83	2	2		N/A	N/A	0.204283235	N/A	N/A	10.43850432	2.106974128	0.24783	**3.249397847**
ALT #5	$ 1,143,115.96	0	3		N/A	N/A	N/A	N/A	N/A	0.398895617	2.106974128	0.24783	**0.917899815**

7.0 – Implemenation Strategy

7.1 Section Priorities

The Billings Section of the Railroad Study contains three (3) separate locations where the proposed improvements are recommended. These areas are listed above in Section 4 and are listed below from North to South:

Project Location No. 1 – Rose Hill Rd.
Project Location No. 2 – Vermule, Lambeth, & Kastendieck Rd.
Project Location No. 3 – Aloe Rd.

It is recommended that all project locations be performed under one contract to minimize disruption to local vehicle and rail traffic. Depending on available funding, if all project locations can not be completed under one construction contract, it is recommended that the benefit-cost ratio values be used to determine priorities within this section. Based on this information, the suggested implementation plan is shown in order of theoretical safety benefit:

Project Location No. 2 – Vermule, Lambeth, & Kastendieck Rd.
Project Location No. 1 – Rose Hill Rd.
Project Location No. 3 – Aloe Rd.

It should be mentioned that the Section through Billings is only one of three sections within the overall study limits and additional priorities for

implementation will be outlined in the context of the entire study limits in Section 5 of the Report.

7.2 MOU & Agreements

The department has met with all public agencies and the BNSF Railway on the final recommendations for this section of the study and have obtained verbal approval in moving forward with finalizing a memorandum of understanding (MOU) or construction agreement to implement the improvements as presented. There is anticipated to be 1 agreement for the three different project locations that will involve the different parties based on juridictional authorities of adjacent roadways:

MOU / Construction Agreement No. 1 – Project Location 1, 2, and 3

- MoDOT
- BNSF Railway
- Christian County
- Billings Special Road District

MoDOT will serve as the sponsor and the lead agency for the development and coordination of the MOU and Construction Agreements with the Railway and Local Public Agencies.

7.3 Funding Sources & Schedule

Although there are no funds committed for the project implementation at this time, MoDOT is pursuing many different funding sources to complete the recommended improvements along the corridor. Opportunities and partnerships to obtain funding for the project include, but are not limited to the following:

- FRA Grant Dollars
- MoDOT Multi-Modal Department – Rail Safety Funding
- MoDOT SW District
- BNSF Railway

It is not anticipated that any of the local public agencies will contribute funding towards the recommended improvements. However, once funding for the projects have been programmed, detailed design for the recommended improvements will need to be completed and a design and construction schedule should be developed and communicated with all parties for implementation.

7.4 Communication Plan

Communication with the public and receiving local input was vital to the success of the Railroad Safety Study. It is recommended that MoDOT, in partnership with the local public agencies continue to update the public and participating partners on the progress towards implementing the project. A master contact list is located in Section 2 of the report and should be used when final plans and funding are obtained for the improvements.

APPENDIX A MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY BILLINGS SECTION Monday, November 27, 2017 ALTERNATE #1B COST ESTIMATE	
	TOTAL
DEMOLITION	**$ 20,000**
Existing Pavement Removal	$ 20,000
STRUCTURAL	**$ -**
N/A	N/A
ROADWAY	**$ 1,020,000**
Excavation	$ 40,000
Embankment	$ 120,000
Aggregate Base (4")	$ 95,000
Full Depth Pavement (8")	$ 710,000
Drainage	$ 30,000
Pavement Marking	$ 5,000
Erosion Control	$ 15,000
Signing	$ 5,000
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ 560,000**
BNSF RR At-Grade Removal	$ 60,000
Railroad Crossing Gates	$ 500,000
MOBILIZATION	**$ 100,000**
Assume 6% for Mobilization	$ 100,000
MAINTENANCE OF TRAFFIC	**$ 25,000**
Assume Staged Constuction	$ 25,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 1,725,000**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 345,000**
SUB-TOTAL	**$ 2,070,000**
INFLATION (3% PER YEAR) ASSUMING CONSRUCTION IN 2019	**$ 124,200**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 2,194,200**
UTILITIES	**$ 100,000**
Overhead High-Voltage Electrical Relocation	$ 75,000
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	$ 25,000
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ 37,500**
ROW - Vermule to Kastendieck Connection	$ 20,000
ROW - Lambeth-Truck Turnaround	$ 7,500
ROW - Lambeth/ Kastendieck Intersection	$ 5,000
ROW - US 60/ Kastendieck	$ 5,000
ENGINEERING	**$ 187,700**
Phase 2 Design Phase Engineering	$ 187,700
SUB-TOTAL	**$ 325,200**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 2,519,400**
NOTES:	
1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.	
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.	

APPENDIX A
MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY
BILLINGS SECTION
Monday, November 27, 2017
ROSE HILL ROAD

	TOTAL
DEMOLITION	**$ 3,500**
Existing Pavement Removal	$ 3,500
STRUCTURAL	**$ -**
Underpass Construction	N/A
ROADWAY	**$ 112,250**
Excavation	-
Embankment	$ 20,000
Aggregate Base (4")	$ 10,500
Full Depth Pavement (8")	$ 80,000
Drainage	N/A
Pavement Marking	$ 750
Erosion Control	$ 1,000
Signing	N/A
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ -**
BNSF RR At-Grade Removal	N/A
Railroad Crossing Gates	N/A
MOBILIZATION	**$ 7,000**
Assume 6% for Mobilization	$ 7,000
MAINTENANCE OF TRAFFIC	**$ 5,000**
Assume Staged Constuction	$ 5,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 127,750**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 25,550**
SUB-TOTAL	**$ 153,300**
INFLATION (3% PER YEAR) ASSUMING CONSTRUCTION IN 2019	**$ 9,198**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 162,498**
UTILITIES	**$ -**
Overhead High-Voltage Electrical Relocation	N/A
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	N/A
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ -**
O'Dell to MO 14 Connector	N/A
ENGINEERING	**$ 14,000**
Phase 2 Design Phase Engineering	$ 14,000
SUB-TOTAL	**$ 14,000**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 176,498**

NOTES:

1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.

APPENDIX A

MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY
BILLINGS SECTION
Monday, November 27, 2017
VERMULE ROAD

	TOTAL
DEMOLITION	**$ 10,000**
Existing Pavement Removal	$ 10,000
STRUCTURAL	**$ -**
Underpass Construction	N/A
ROADWAY	**$ 280,500**
Excavation	$ 10,000
Embankment	$ 17,500
Aggregate Base (4")	$ 25,000
Full Depth Pavement (8")	$ 200,000
Drainage	$ 20,000
Pavement Marking	$ 2,000
Erosion Control	$ 5,000
Signing	$ 1,000
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ 30,000**
BNSF RR At-Grade Removal	$ 30,000
Railroad Crossing Gates	N/A
MOBILIZATION	**$ 20,000**
Assume 6% for Mobilization	$ 20,000
MAINTENANCE OF TRAFFIC	**$ 10,000**
Assume Staged Constuction	$ 10,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 350,500**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 70,100**
SUB-TOTAL	**$ 420,600**
INFLATION (3% PER YEAR) ASSUMING CONSTRUCTION IN 2019	**$ 24,321**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 444,921**
UTILITIES	**$ 20,000**
Overhead High-Voltage Electrical Relocation	$15,000
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	$5,000
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ 20,000**
Vermule to Kastendieck Connector	$ 20,000
ENGINEERING	**$ 36,500**
Phase 2 Design Phase Engineering	$ 36,500
SUB-TOTAL	**$ 76,500**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 521,421**

NOTES:

1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.

APPENDIX A
MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY
BILLINGS SECTION
Monday, November 27, 2017
KASTENDIECK ROAD

	TOTAL
DEMOLITION	**$ 2,500**
Existing Pavement Removal	$ 2,500
STRUCTURAL	**$ -**
Underpass Construction	N/A
ROADWAY	**$ 329,000**
Excavation	$ 5,000
Embankment	$ 70,000
Aggregate Base (4")	$ 28,000
Full Depth Pavement (8")	$ 217,000
Drainage	$ 5,000
Pavement Marking	$ 1,000
Erosion Control	$ 2,500
Signing	$ 500
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ 250,000**
BNSF RR At-Grade Removal	N/A
Railroad Crossing Gates	$ 250,000
MOBILIZATION	**$ 35,000**
Assume 6% for Mobilization	$ 35,000
MAINTENANCE OF TRAFFIC	**$ 10,000**
Assume Staged Constuction	$ 10,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 626,500**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 125,300**
SUB-TOTAL	**$ 751,800**
INFLATION (3% PER YEAR) ASSUMING CONSTRUCTION IN 2019	**$ 45,108**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 796,908**
UTILITIES	**$ 60,000**
Overhead High-Voltage Electrical Relocation	$ 40,000
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	$ 20,000
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ 5,000**
US 60/Kastendieck	$ 5,000
ENGINEERING	**$ 70,000**
Phase 2 Design Phase Engineering	$ 70,000
SUB-TOTAL	**$ 135,000**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 931,908**
NOTES:	
1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.	
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.	

APPENDIX A
MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY
BILLINGS SECTION
Monday, November 27, 2017
LAMBETH ROAD

	TOTAL
DEMOLITION	**$ -**
Existing Pavement Removal	N/A
STRUCTURAL	**$ -**
Underpass Construction	N/A
ROADWAY	**$ 223,500**
Excavation	$ 18,000
Embankment	$ 2,500
Aggregate Base (4")	$ 22,000
Full Depth Pavement (8")	$ 167,000
Drainage	$ 10,000
Pavement Marking	$ 1,000
Erosion Control	$ 2,500
Signing	$ 500
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ 30,000**
BNSF RR At-Grade Removal	$ 30,000
Railroad Crossing Gates	N/A
MOBILIZATION	**$ 16,000**
Assume 6% for Mobilization	$ 16,000
MAINTENANCE OF TRAFFIC	**$ 10,000**
Assume Staged Constuction	$ 10,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 279,500**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 55,900**
SUB-TOTAL	**$ 335,400**
INFLATION (3% PER YEAR) ASSUMING CONSTRUCTION IN 2019	**$ 20,124**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 355,524**
UTILITIES	**$ 10,000**
Overhead High-Voltage Electrical Relocation	$10,000
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	N/A
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ 12,500**
Lambeth Turnaround	$ 7,500
Lambeth/Kastendieck Intersection	$ 5,000
ENGINEERING	**$ 34,200**
Phase 2 Design Phase Engineering	$ 34,200
SUB-TOTAL	**$ 56,700**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 412,224**
NOTES:	
1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.	
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.	

APPENDIX A
MODOT MULTI-MODAL RAIL CROSSING SAFETY STUDY
BILLINGS SECTION
Monday, November 27, 2017
ALOE ROAD

	TOTAL
DEMOLITION	**$ 1,000**
Existing Pavement Removal	$ 1,000
STRUCTURAL	**$ -**
Underpass Construction	N/A
ROADWAY	**$ 69,900**
Excavation	$ 2,500
Embankment	$ 15,000
Aggregate Base (4")	$ 5,400
Full Depth Pavement (8")	$ 41,000
Drainage	$ 2,000
Pavement Marking	$ 1,000
Erosion Control	$ 2,000
Signing	$ 1,000
ENVIRONMENTAL MITIGATION	**$ -**
Hazardous Waste Disposal	N/A
RAILROAD CROSSINGS	**$ 250,000**
BNSF RR At-Grade Removal	N/A
Railroad Crossing Gates	$ 250,000
MOBILIZATION	**$ 19,500**
Assume 6% for Mobilization	$ 19,500
MAINTENANCE OF TRAFFIC	**$ 5,000**
Assume Staged Constuction	$ 5,000
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2017 DOLLARS)	**$ 345,400**
PRELIMINARY DESIGN LEVEL CONTINGENCY (20%)	**$ 69,080**
SUB-TOTAL	**$ 414,480**
INFLATION (3% PER YEAR) ASSUMING CONSTRUCTION IN 2019	**$ 24,869**
TOTAL CONSTRUCTION OPINION OF PROBABLE COST (2019 DOLLARS)	**$ 439,349**
UTILITIES	**$ 10,000**
Overhead High-Voltage Electrical Relocation	$10,000
Potential Underground Gas Relocation	N/A
Potential Underground FO Relocation	N/A
Potential Sanitary Sewer Relocate	N/A
Potential Water Main Relocate	N/A
LAND ACQUISITION	**$ -**
Lambeth Turnaround	N/A
ENGINEERING	**$ 33,000**
Phase 2 Design Phase Engineering	$ 33,000
SUB-TOTAL	**$ 43,000**
TOTAL PROGRAM BUDGET (2019 DOLLARS)	**$ 482,349**

NOTES:

1. The Opinion of Probable Cost Assumes a Reasonable Schedule for Construction with No Additional Contingencies Estimated for Acceleration.
2. The Opinion of Probable Cost Does not Include any Additional Contingencies for Escalation of Steel and Fuel Costs.

LEGEND

- BNSF MAINLINE
- BNSF SPURLINE
- ROADWAY IMPROVEMENTS
- INTERSECTION IMPROVEMENTS
- CROSSING REMAINS OPEN
- AT-GRADE CROSSING CLOSURE
- AT-GRADE CROSSING REMAINS OPEN WITH IMPROVEMENTS

ROSE HILL RD. AT-GRADE
DOT # - 673285W
M.P. 255.10

ROSE HILL RD.

ROSE HILL RD.

US HWY. 60

WASHINGTON AVE. AT-GRADE
DOT # - 673290T
M.P. 257.15

JEFFERSON ST.

JEFFERSON AVE. AT-GRADE
DOT # - 673289Y
M.P. 257.03

2ND ST.

TERRILL CREEK RD.

MT. VERNON RD. AT-GRADE
DOT # - 673292G
M.P. 257.73

US HWY. 60

JEFFERSON AVE.

MT. VERNON RD.

MT. VERNON RD.

VERMULE RD. AT-GRADE
DOT # - 673295C
M.P. 259.59

VERMULE RD.

US HWY. 60

KASTENDIECK RD.

LAMBETH RD. AT-GRADE
DOT # - 673297R
M.P. 260.19

KASTENDIECK RD. AT-GRADE
DOT # - 673296J
M.P. 259.88

ALOE RD.

LAMBETH RD.

ALOE RD. AT-GRADE
DOT # - 673298X
M.P. 261.00

ZOLLER RD.

US HWY. 60

CHRISTIAN COUNTY

ALTERNATE 1B
DRAFT – APRIL 25, 2017