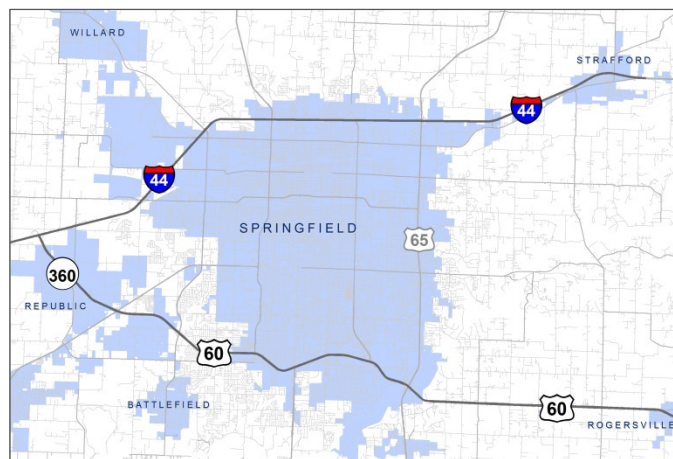




Springfield Freeway Study Final Report

I-44 and US 60/State Highway 360

#2017-10-40066

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Springfield, MO

July 9, 2018



OZARKS TRANSPORTATION ORGANIZATION

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Executive Summary

This report summarizes the analysis leading to the long-term prioritization of improvements along Interstate 44 and US Highway 60 in and near the city of Springfield, MO. The study team examined existing conditions related to traffic flow, safety, roadway design, and bridge ratings. The team also developed traffic flow analysis for the year 2040 to identify future capacity needs. Based on these investigations, this report presents a series of recommended projects, including such items as ramp terminal intersection improvements, interchange reconfigurations, grade separations, auxiliary lanes, acceleration/deceleration lane improvements, and a braided ramp. For each project, the study team developed conceptual drawings and cost estimates.

The study team developed monetized estimates of the traffic operational and safety benefits expected to result from each individual project. Prioritization was based on the comparison of these monetized benefits with the estimated costs over a 2018-2040 time horizon. As **Table E-1** shows, the projects were ranked two different ways: using a Benefit/Cost (B/C) Ratio, and a Net Benefit estimate (monetized benefits minus costs). As the table indicates, the resulting rankings are not very dissimilar when comparing major projects. The top four large (>\$9M) projects are the same “bundle” in both lists, and really represent two projects: (1) US-60 / Route 125 grade separation, and (2) a braided ramp improvement on US-60 in the area from Glenstone Avenue to US-65. Projects 60E-5 and 60E-6, the remaining two projects, both obtain nearly all their traffic delay benefits from the US-60 / Route 125 grade separation, and thus should ultimately be prioritized much lower on the list. The fifth large project is conversion of US-60 to a freeway from Highland Springs Road to Route J / NN.

These rankings and costs can be used by MoDOT at a programming level in formulating the Statewide Transportation Improvement Program (STIP). Projects below a B/C ratio of 0.8 are not at a stage of need where inclusion in the STIP is recommended.

Table E-1: Recommended Project Prioritization

Benefit/Cost Ratio				Net Benefit Est.	
Rank	Segment	Cost	ID	ID	Rank
1	I-44, at Route 125 Signalize WB ramp, accel/decel improvements, close weigh station	\$1,049,000	44-8	60E-1	1
2	I-44, at Highway 160 (West Bypass) 2nd LT lane WB off-ramp, accel/decel improvements	\$588,000	44-5	60E-5	2
3	US-60, at National Add turn lanes; improve ramps	\$1,088,000	60W-6	60E-6	3
* 4	US-60, Route 125 to FR 247 close at grades; add outer roads	\$9,238,000	60E-6	60W-1	4
* 5	US-60, East of FR 213 to Rte. 125 close at grades; add outer roads	\$10,194,000	60E-5	44-8	5
6	US-60, at US-65 Accel/Decel improvements	\$750,000	60W-5	60W-6	6
7	US-60, at Route 125 Convert to Interchange	\$11,883,000	60E-1	44-5	7
8	US-60, National to US-65 EB Braided Ramp + Interchange improvements	\$14,591,000	60W-1	60W-5	8
9	I-44, at MM/B Roundabouts at both terminals, accel/decel improvements	\$3,697,000	44-2	44-3	9
10	US-60, Highland Springs to J / NN close at-grades + add outer roads	\$10,558,000	60E-2	44-2	10
11	I-44, at Mulroy Roundabouts at both terminals, accel/decel improvements	\$2,895,000	44-7	44-4	11
12	US-60, J / NN to East of FR 213 close at-grades; add outer roads + signalize WB ramps at J / NN	\$12,697,000	60E-4	60W-2	12
13	US-60, at FR 189 Convert to Interchange + add outer roads	\$20,558,000	60E-3	44-7	13
14	I-44, Route 13 (KS Expwy) to US-65 Aux lanes + Interchange Improvements	\$25,758,000	44-1	60E-2	14
15	I-44, at Chestnut Expwy Extend and provide positive separation for WB accel	\$356,000	44-3	60E-4	15
16	I-44, at US-65 SB-to-EB flyover	\$13,102,000	44-6	44-6	16
17	I-44, West of Route 744 (Kearney) Extend and provide positive separation for WB accel	\$919,000	44-4	60E-3	17
18	US-60/360, at MM Signals and LT lanes at both ramps	\$814,000	60W-2	44-1	18

*Projects 60E-5 and 60E-6 obtain nearly all their traffic delay benefits from project 60E-1, and so are not considered high priority.

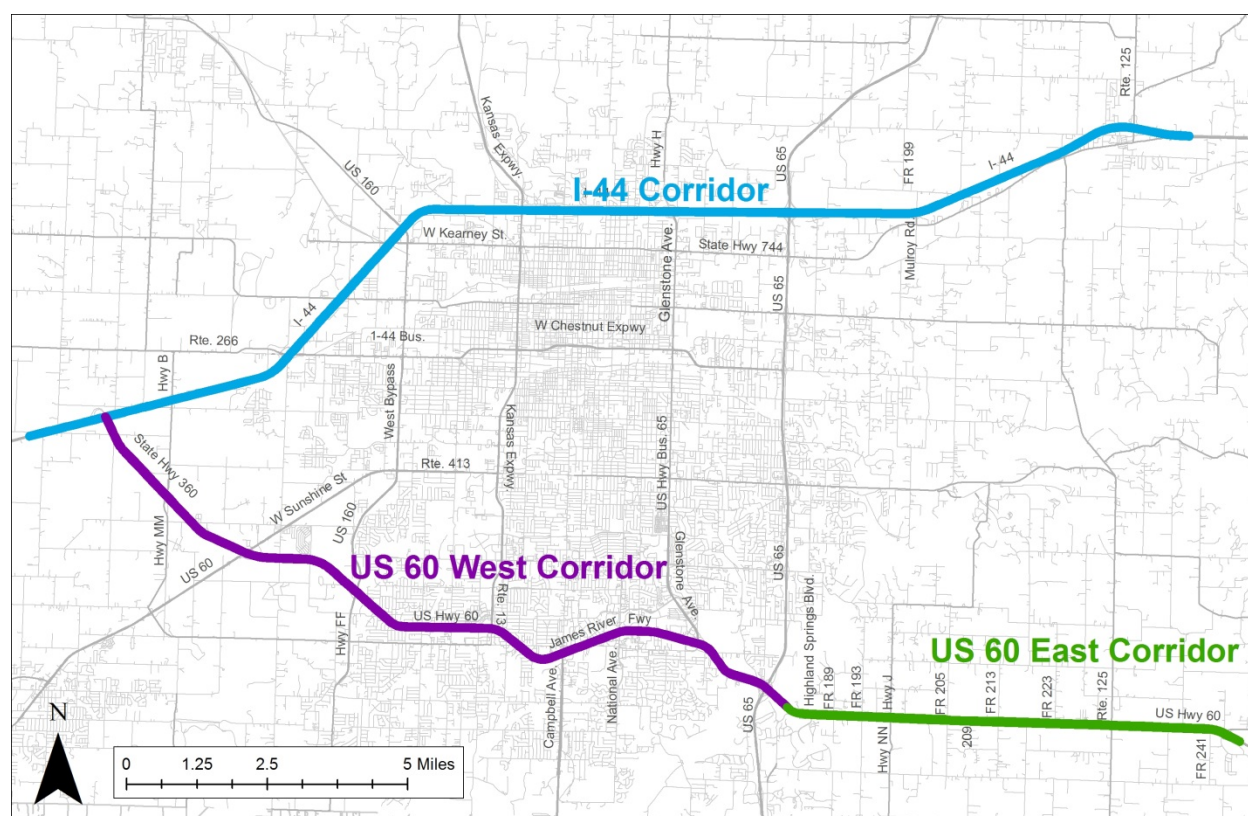
**Typically, projects with a Benefit-Cost (B/C) Ratio of 1.0 or greater are reasonable to construct during the planning horizon (2040). Due to the fact that a small number of benefits are not accounted for in the study methodology, two projects with B/C ratios >0.8 are also reasonable to consider.

Introduction

MoDOT's Southwest District, in cooperation with the Ozarks Transportation Organization (OTO), has undertaken a study to identify and prioritize highway projects along three corridors in the Springfield area. The three corridors are described below and shown in **Figure 1**.

- US 60/360 from I-44 to US 65 (referred to as the US 60 West corridor in this document)
- US 60 from US 65 to FR 247 (referred to as the US 60 East corridor in this document)
- I-44 from US 60/360 to Hwy 125

Figure 1: Study Corridors



MoDOT's mission is to provide a world-class transportation system that is safe, innovative, reliable and dedicated to a prosperous Missouri. MoDOT has three key values that represent the fundamental principles and philosophy of the agency: "Safety", "Service", and "Stability".

- This study prioritized "Safety" through developing projects that would have a tangible safety benefit through anticipated reduction in crashes.
- This report is in keeping with MoDOT's "Service" value in that it identifies transportation solutions of great value and prioritizes the solutions such that resources are used wisely.

- The “Stability” value is a key theme throughout this report as the analysis identifies projects needed to keep roads and bridges in good condition, maintain the existing transportation infrastructure in a reliable and convenient condition, and provide a safe and efficient transportation system that will support and advance economic development.

In assisting MoDOT to fulfill its mission to MoDOT customers, this report provides the following tangible results:

1. Keep Customers and Ourselves Safe – This study identified locations with high crash rates and projects were developed to reduce these crashes and ultimately improve safety.
2. Keep Roads and Bridges in Good Condition – This study evaluated the existing condition of the bridges and roadways along the study corridors and identified locations that were below “good” condition or not meeting current standards. These locations with deficiencies were considered when identifying projects based on poor LOS and high crash rates.
3. Providing Outstanding Customer Service – MoDOT customers expect great and timely projects to be delivered. This report provides an in-depth analysis that results in the development of great and needed projects, which are prioritized to meet the needs of the corridors through the study horizon.
4. Deliver Transportation Solutions of Great Value – The projects developed in this report provide solutions that target improvements to safety and efficiency, without recommending unnecessary, costly improvements.
5. Operate a Reliable and Convenient Transportation System – A “reliable” transportation system must be one that is in at least “good” condition. The projects recommended in this report consider the condition of the roadway and bridges in an effort to ensure their condition remain or are improved to good or better. A “convenient” transportation system must be easy to use and provide quick, direct access for all users. Project developed in this study made efficiency a priority while balancing the need for access based on land use.
6. Use Resources Wisely – This study was conducted in an effort to ensure that the study corridors were evaluated properly and projects prioritized to get the best value for the dollar through the study horizon year. This ensures that funding is used when and where it is actually needed.
7. Advance Economic Development – Safe and efficient transportation systems have been proven to assist in providing economic and social opportunities and benefits. The prioritized list of projects in this report provides a pathway to improving and keeping the MoDOT transportation system in a safe and efficient condition, which will ultimately support economic development.

Existing/No-Build Conditions

In order to understand the existing conditions and needs along the three corridors, assessments were performed on current traffic operations, projected future no-build traffic operations, safety performance, roadway conditions, and bridge conditions.

Operational Assessment

Traffic count data was obtained from MoDOT and supplemented with additional counts conducted by the consultant team where needed. Older counts were extrapolated and balanced along the corridors to establish a common existing baseline year. See **Figures 2-4** for existing (2017) volumes.

Figure 2: 2017 Volumes, US 60 West Corridor

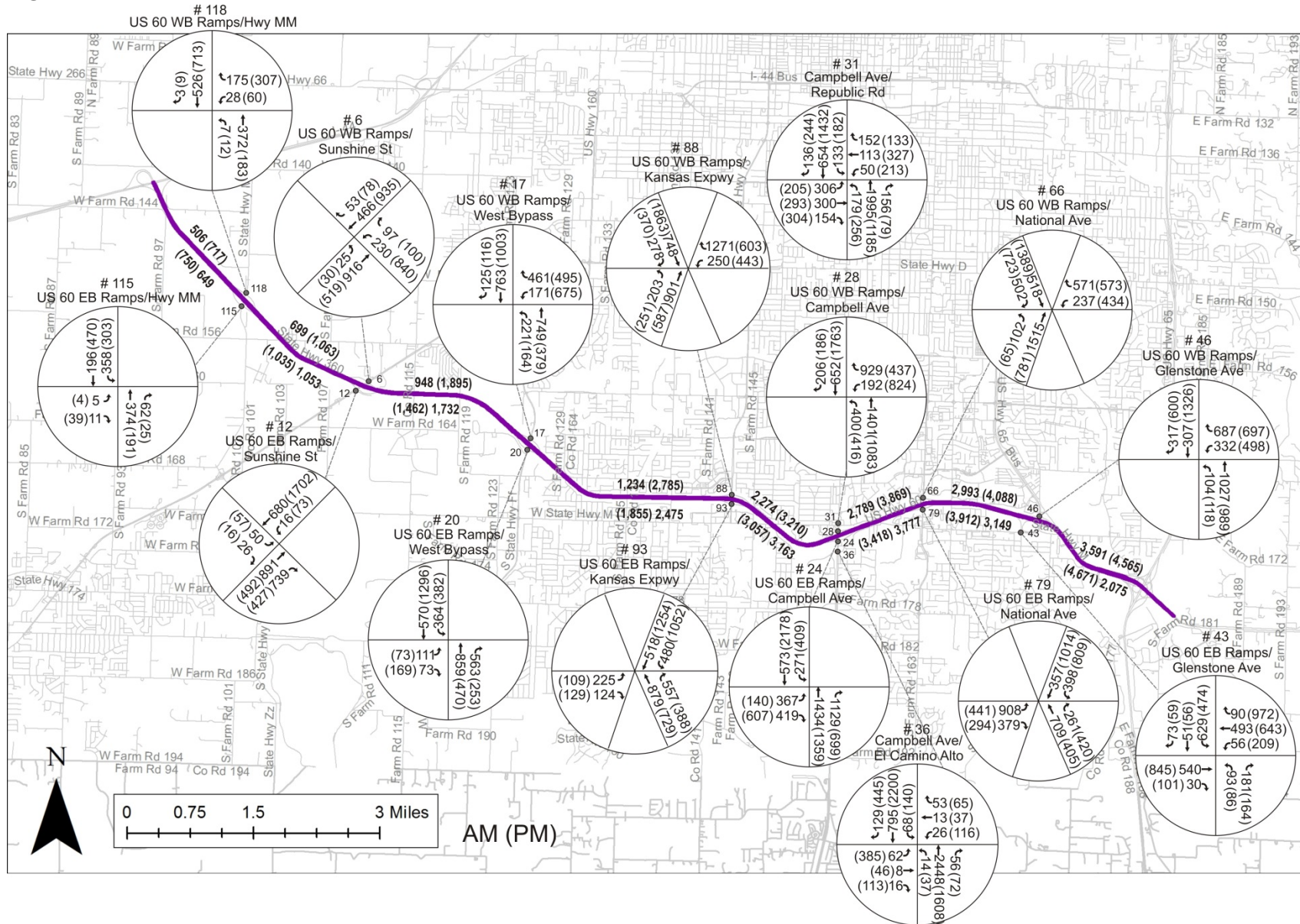


Figure 3: 2017 Volumes, US 60 East Corridor

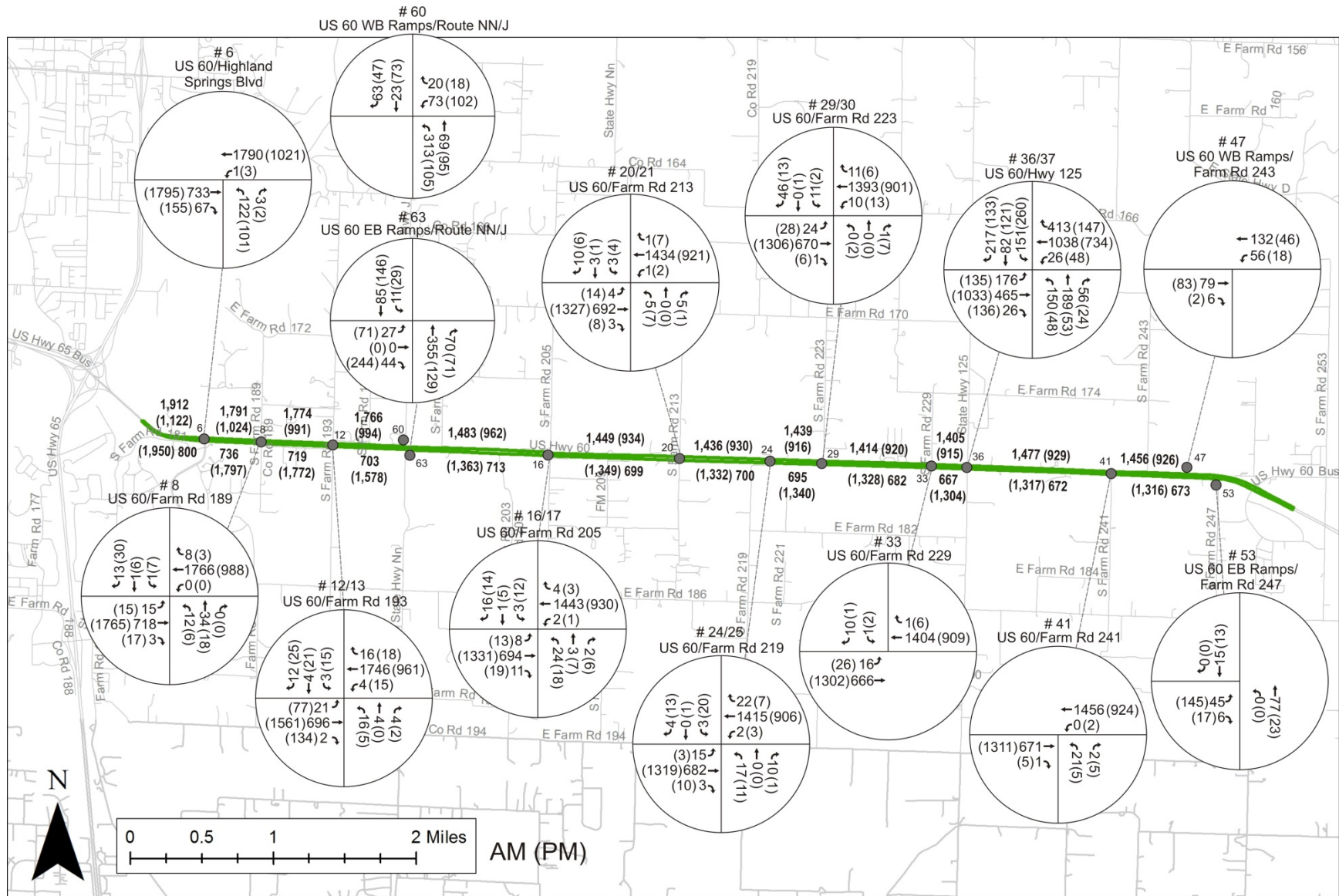
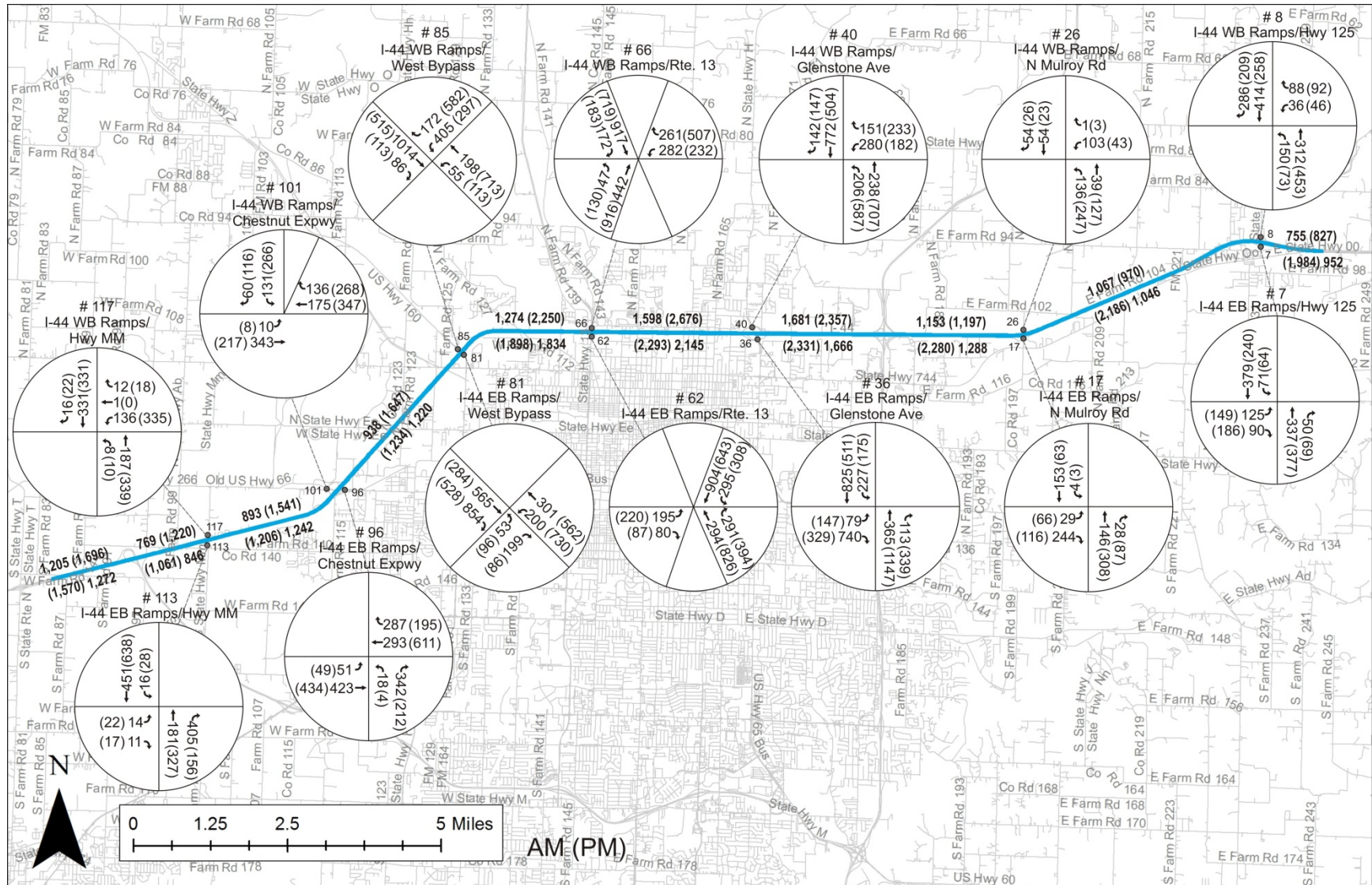


Figure 4: 2017 Volumes, I-44 Corridor



2017 Existing Conditions (No-Build) Operational Analysis

The baseline volumes were analyzed with the current roadway and intersection configurations to determine the current levels of service for the study corridors. Intersection analyses were performed using Synchro, and mainline analyses were performed using FREEVAL. Synchro is a traffic engineering software used to determine macro level LOS, delays, and other operational measures of effectiveness for arterials and intersections. FREEVAL (**FREE**way **EVAL**uation) is a software designed to *faithfully implement* the Highway Capacity Manual 6th Edition (HCM) operational analysis computations for undersaturated and oversaturated directional freeway facilities, which incorporate basic freeway segments, weaving segments, and merge and diverge segments. Of particular note, FREEVAL utilizes a Truck to Passenger Car Equivalent (ET) of 2.0, meeting the recommendations of the HCM 6th Edition. Locations currently experiencing conditions of LOS D or worse are identified below and were used as indicators of future congestion, or near-congestion, and areas of higher delay, in order to develop a robust list of potential improvement projects for screening, evaluation and prioritization.

The only study corridor currently experiencing segments operating at LOS D or worse is the US 60 West Corridor, specifically in the eastbound direction. All segments along the US 60 East and I-44 Corridors currently operate at LOS C or better. Eight segments on US 60 West operate at LOS D or worse during the PM peak. These segments are primarily located between the National Avenue interchange and the US-65 interchange. There are no segments that operate at LOS D or worse during the AM peak. The results for all segments operating at LOS D or worse are shown in **Table 1**. For the full existing segment analysis results see Appendix B.

Table 1: Existing Segments Experiencing LOS D or Worse

		PM Peak Hour		
Description	Type	LOS	Density (veh/mi/ln)	V/C
US 60 West Corridor - Eastbound				
Between National Ave Off-Ramp and National Ave On-Ramp	Basic	F	51.0	0.61
National Ave On-Ramp	Merge	E	71.3	0.88
Between National Ave On-Ramp and Republic Rd Off-Ramp	Basic	F	119.1	0.59
Republic Off-Ramp	Diverge	E	84.4	0.88
Between Republic Off-Ramp and BUS-65 On-Ramp	Basic	F	101.2	0.75
BUS-65 On-Ramp	Merge	E	68.8	0.96
Republic On-Ramp	Merge	D	32.9	1.05
US-65 Off-Ramp	Diverge	D	31.6	1.05

*LOS = Level of Service | V/C = volume-to-capacity ratio

At the intersection level, several locations currently experience LOS D or worse within each of the three study corridors, as shown in **Table 2**. As noted in the table, for unsignalized intersections, the LOS and delay for the worst movement is shown. Along the US 60 East corridor, a number of intersections reportedly operate at LOS D or worse; however, it should be noted that the delay at those intersections applies to side street movements with fairly low volumes, not to the heavier volumes along the US 60 mainline. Full intersection results are available in Appendix B.

Table 2: Existing Intersections Experiencing LOS D or Worse

		AM		PM	
Syn_ID	Intersection	LOS	Delay (s/veh)	LOS	Delay (s/veh)
US 60 West Corridor					
118*	US 60 WB Ramps & Hwy MM			D	25.3
115*	US 60 EB Ramps & Hwy MM	F	52	E	43
93	US 60 EB Ramps & Kansas Expwy			F	109.2
31	Campbell Ave & Republic Rd	E	61.8	E	58.7
62*	US 60 & National Ave EB On-Ramp			F	197.1
46	US 60 WB Ramps & Glenstone Ave	D	41.5	E	64.7
US 60 East Corridor**					
5/6*	US 60 & Highland Springs Blvd	E	38.5	F	573.3
8/9*	US 60 & Farm Rd 189	F	231.5	F	120.2
12/13*	US 60 & Farm Rd 193	F	102.1	F	77.3
60*	US 60 WB Ramps & Route NN/J	D	34.1		
16/17*	US 60 & Farm Rd 205	D	33.9	E	47
20/21*	US 60 & Farm Rd 213	E	38	D	30.9
24/25*	US 60 & Farm Rd 219	F	52.1	D	30.9
29/30*	US 60 & Farm Rd 223	F	78.4		
33/34*	US 60 & Farm Rd 229	E	46.8		
36/37	US 60 & Hwy 125	F	1750.5	F	502
40/41*	US 60 & Farm Rd 241			D	32.7
I-44 Corridor					
117*	I-44 WB Ramps & Hwy MM			F	75.4
101	I-44 WB Ramps & Chestnut Expwy	D	36.8		
62	I-44 WB Ramps & Route 13			D	45.8
40	I-44 WB Ramps & Glenstone Ave			D	38.9
8*	I-44 WB Ramps & Hwy 125	E	38		

LOS = Level of Service

*At unsignalized intersections, LOS and Delay for the worst movement is shown.

**In the Synchro files, at-grade intersections were coded as two separate intersections (a north and south couplet); however, for the purposes of this table, each couplet is shown on one line and the worst results among the two intersections are shown for each peak.

Figures 5 and 6 illustrate the existing LOS along each corridor and at each of the study intersections for both the AM and PM peak hours.

Figure 5: 2017 No-Build Mainline & Intersection Levels of Service – AM Peak Hour

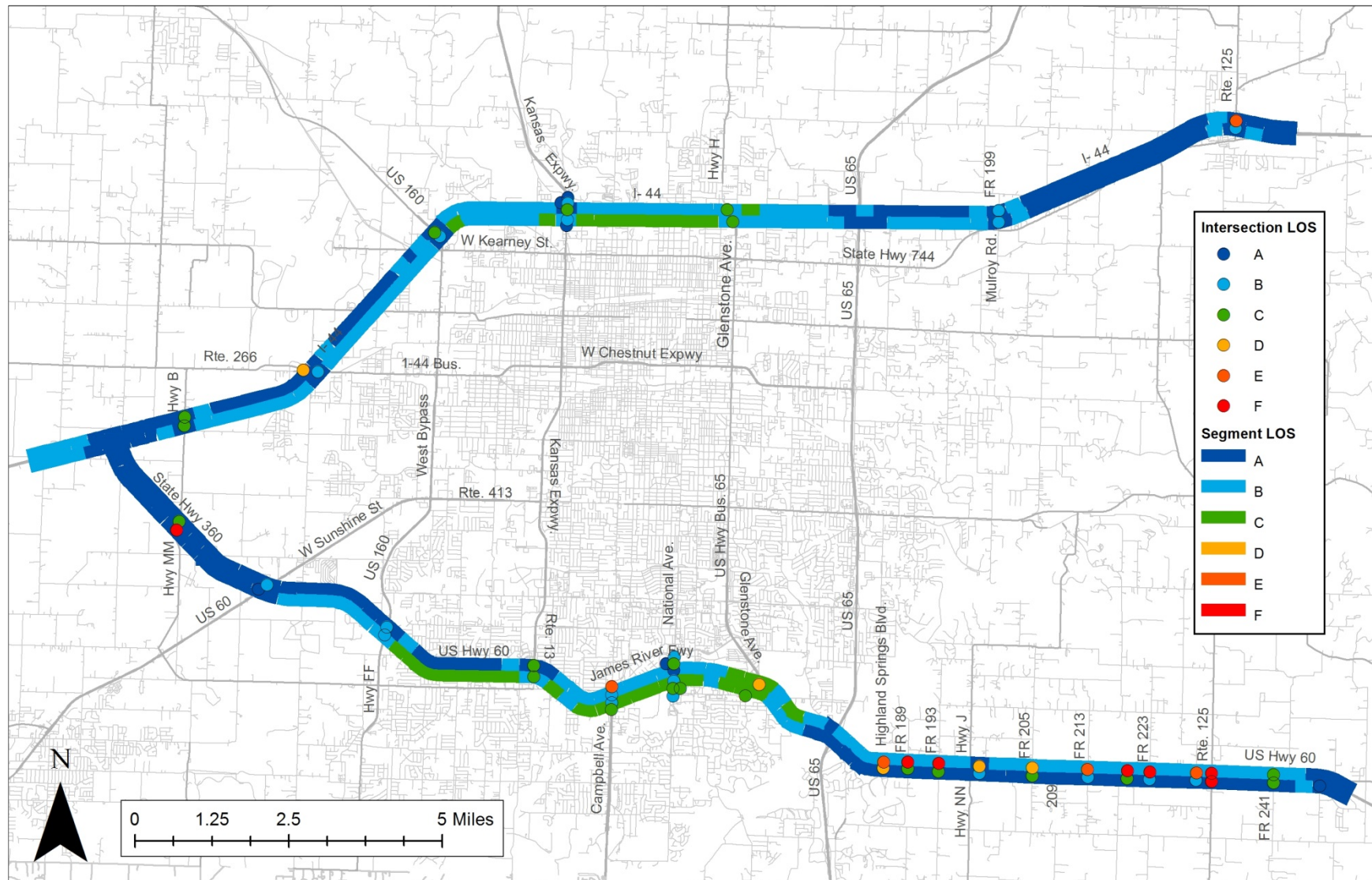
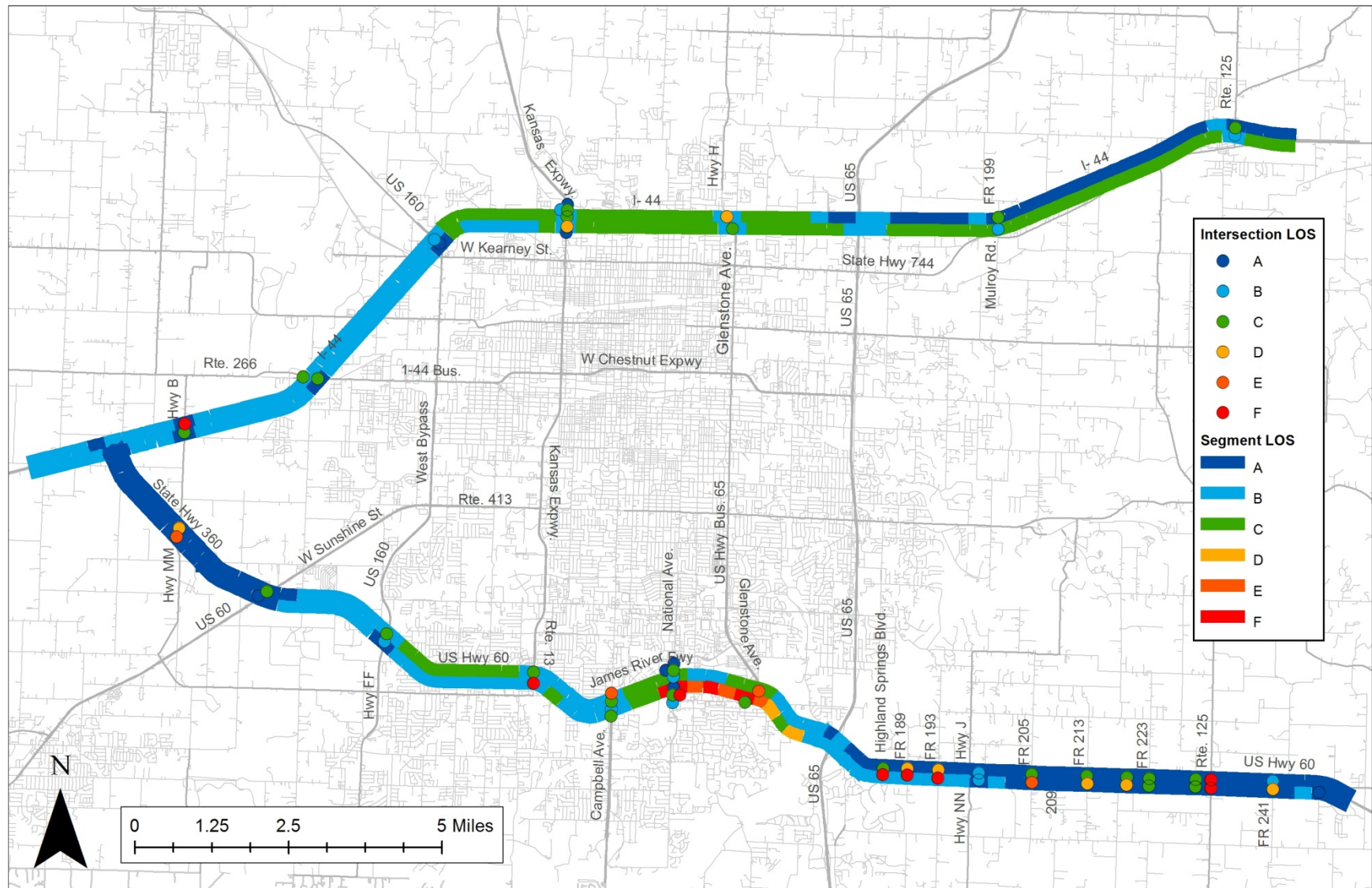


Figure 6: 2017 No-Build Mainline & Intersection Levels of Service – PM Peak Hour



2040 No-Build Operational Analysis

Using the OTO Travel Demand Model, growth rates were developed to adjust the baseline volumes to the projected 2040 horizon analysis year. Daily travel demand model outputs were obtained for the OTO's base year of 2012 and the near-term horizon year of 2030. An annual growth rate for each study segment (mainline and ramp) was calculated based on those endpoints, and adjusted within reasonable tolerances to maintain a balanced network. In general, mainline growth rates were assumed to have more accuracy than the ramp rates and were therefore more likely to be held constant (or have a slight adjustment) during the balancing process. The growth rates were then applied to the new 2017 baseline volumes to project to the forecasted 2040 volumes. Growth rates ranged from 0.1% to 4.75% at various locations along the study corridors. **Figures 7-9** display these projected 2040 volumes.

The methodology used above is common for future year projections in a planning study. It is acknowledged that the travel demand model growth rates should periodically be reviewed and updated to accurately reflect changes in the community and surrounding communities. These changes will allow planners to react more quickly to the changing needs of the transportation system and prioritize projects accurately. Project needs and priorities provided in this report should be subject to change as model updates are made and changes in growth rates and locations become known.

Figure 7: 2040 Volumes, US 60 West Corridor

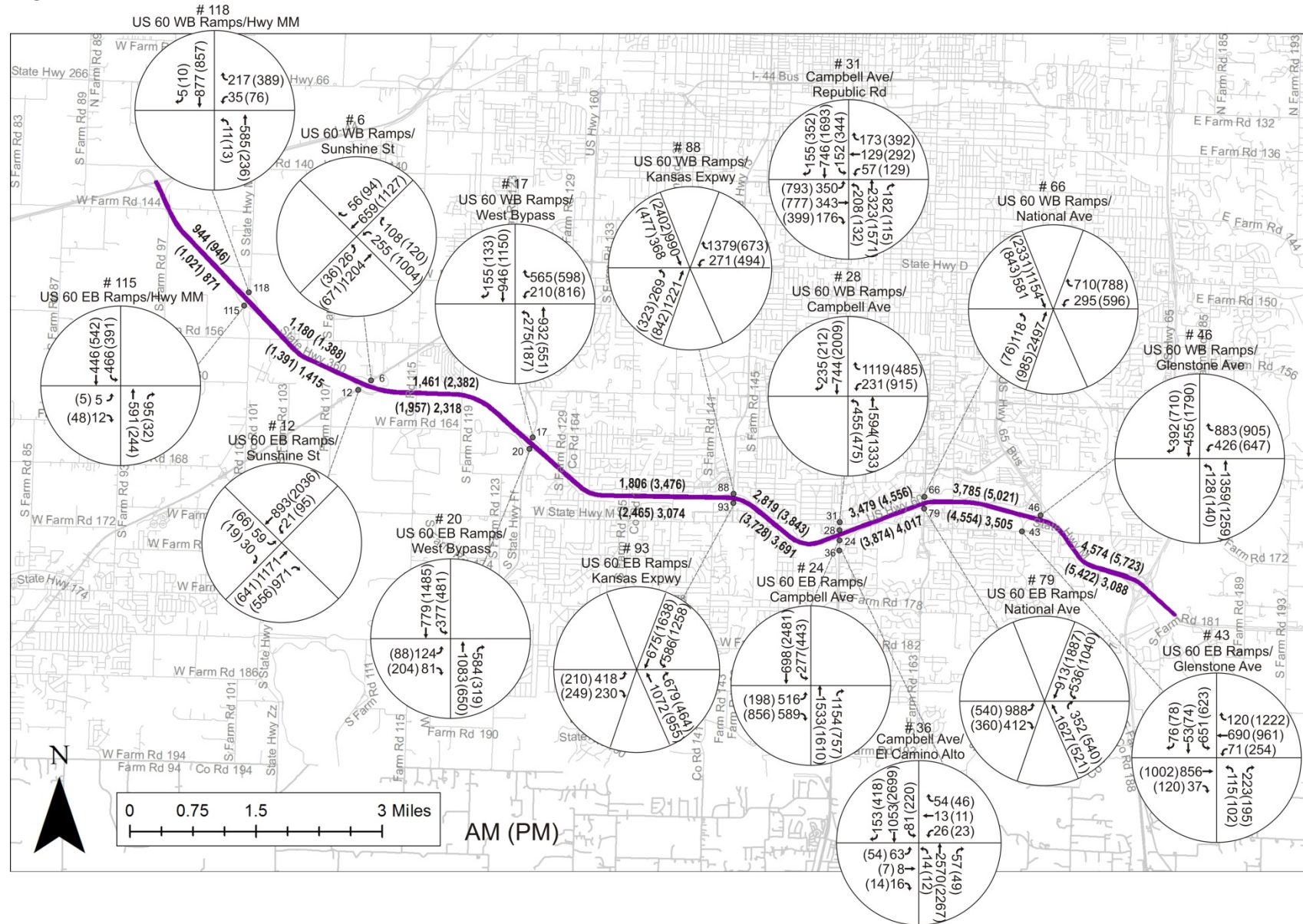


Figure 8: 2040 Volumes, US 60 East Corridor

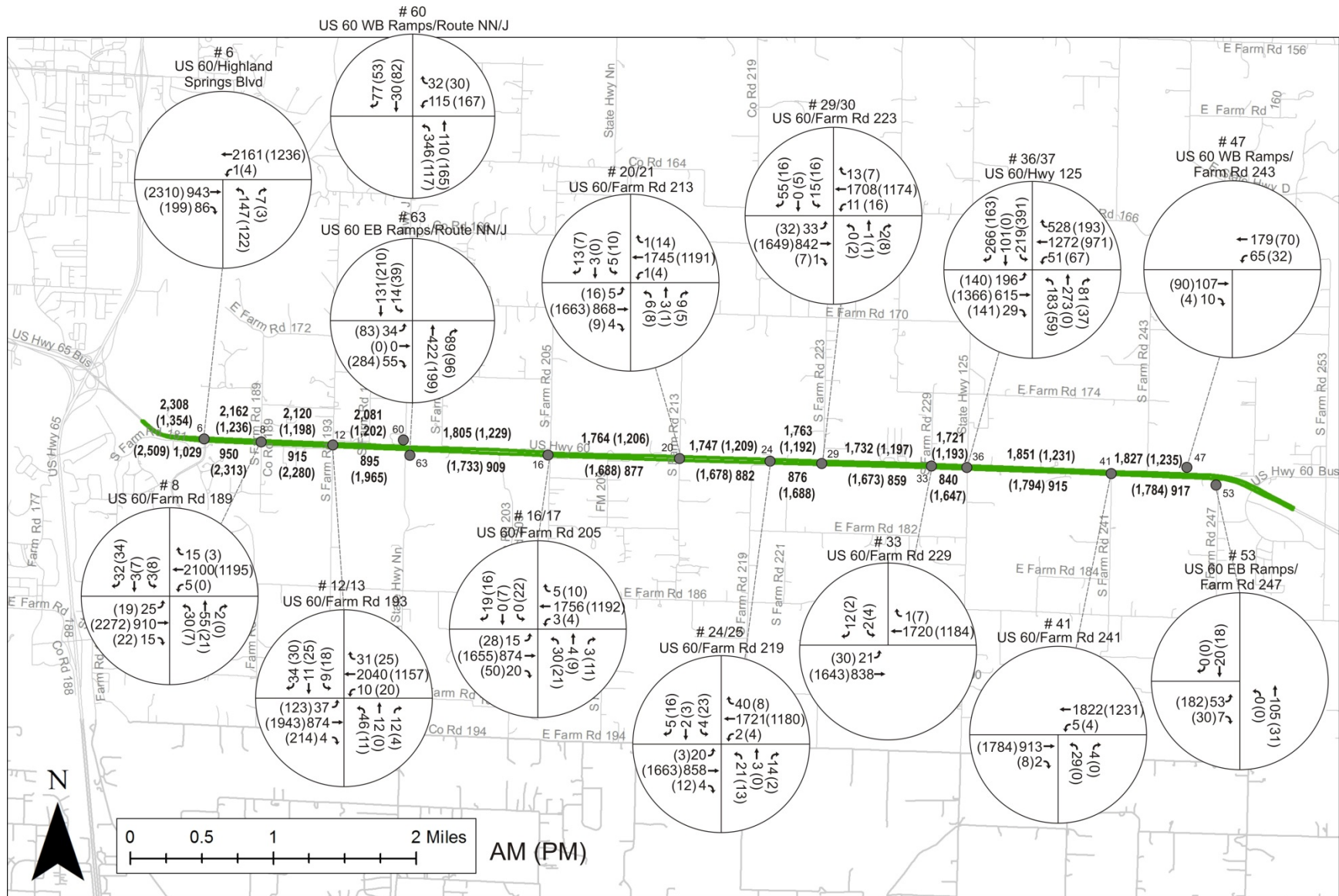
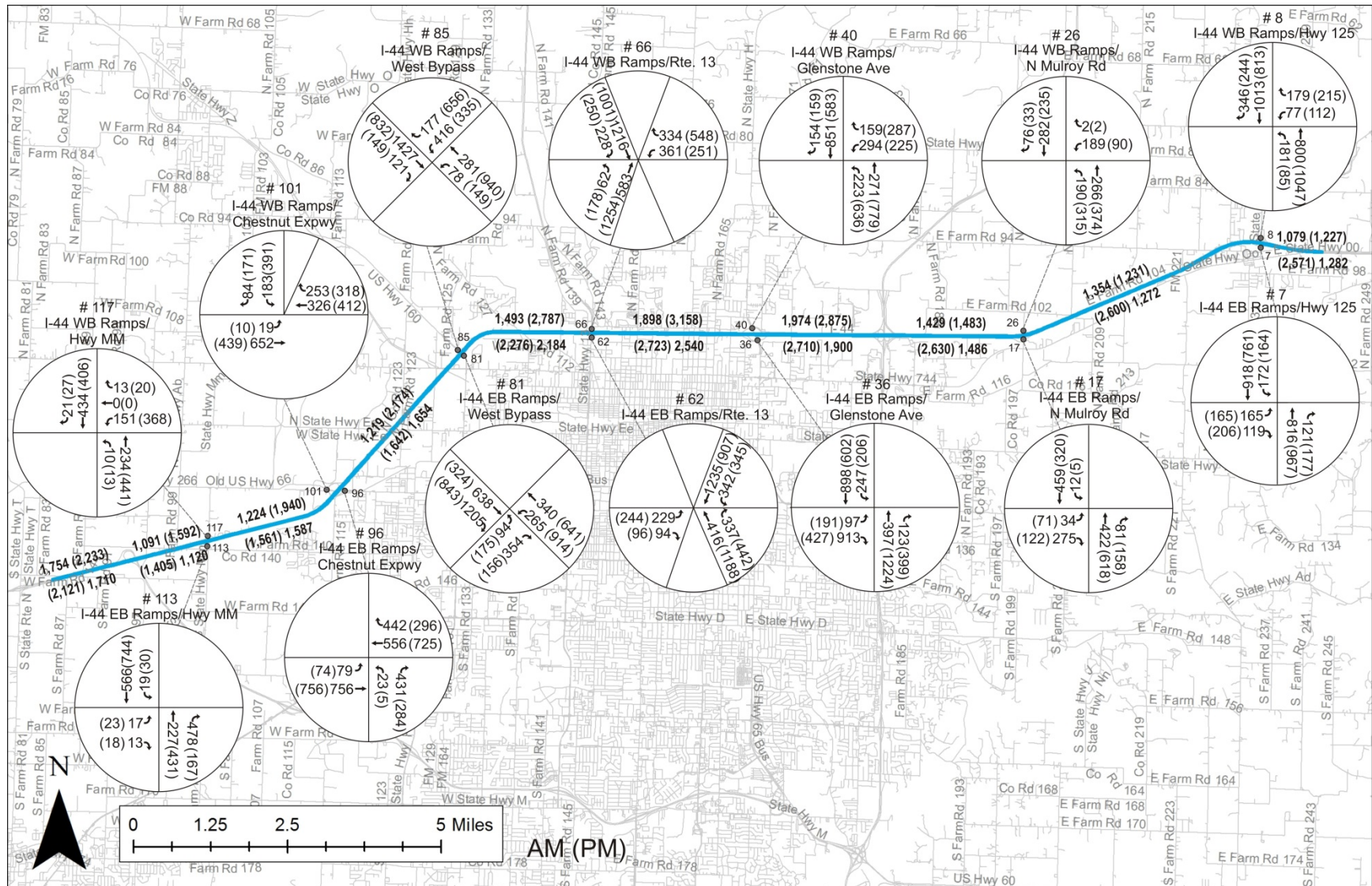


Figure 9: 2040 Volumes, I-44 Corridor



The 2040 no-build analysis used the same tools as the existing conditions analysis to determine how well the mainline and intersections along the corridor can be expected to operate under the future no-build conditions.

During the AM peak hour, several basic segments along eastbound US 60 are expected to continue to operate at LOS D or worse. In addition, several westbound US 60 segments are expected to operate at LOS D or worse by 2040. The PM peak hour is projected to experience wider-ranging congestion than the AM peak, with 13 segments along the US 60 West Corridor experiencing LOS D or worse. During the PM peak, there are also a number of segments along I-44 in both directions that are projected to operate at LOS D. All of the segments projected to operate at LOS D or worse are shown in **Table 3** below. Full corridor results are provided in Appendix C.

Note that the 2040 No-Build scenario includes auxiliary lanes on US-60 from National Avenue to Glenstone Avenue. This project is currently under construction by MoDOT. Even with this project in place, spillback issues related to the Glenstone Avenue and US-65 interchanges are forecasted to cause eastbound congestion issues.

In the 2040 No-Build intersection analysis, signal timings were optimized in the Synchro files, assuming that by 2040 adjustments would be made to ensure that the signals are operating at their fullest potential. For this reason, a small number of intersections that were shown to be experiencing LOS D or worse in 2018 are projected to operate at LOS C or better in 2040. Those intersections are excluded from **Table 4**. However, there are several other additional intersections that are expected to degrade to LOS D or worse with the projected 2040 volumes. **Table 4** lists all of these intersections; Appendix C contains the full analysis results for all intersections.

Figures 10 and 11 also display the full LOS results for both segments and intersections for the 2040 no-build conditions.

Table 3: 2040 Segments Experiencing LOS D or Worse

Description	Type	AM			PM		
		LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
US 60 West Corridor - Eastbound							
MO-13 On-Ramp	Merge				D	32.8	0.84
Between MO-13 On-Ramp and S Campbell Off-Ramp	Basic				F	56.0	0.56
S Campbell Off-Ramp	Diverge				E	53.2	0.84
Between S Campbell Off-Ramp and On-Ramp	Basic				E	40.5	0.61
Between S Campbell On-Ramp and S National Off-Ramp	Weave	D	30.2	0.83	F	97.9	0.72
Between National Ave Off-Ramp and On-Ramp	Basic				F	119.1	0.67
National Ave On-Ramp	Merge				E	87.4	1.03
Between National Ave On-Ramp and Republic Rd Off-Ramp	Basic				F	124.4	0.68
Republic Off-Ramp	Diverge				E	89.5	1.03
Between Republic Off-Ramp and BUS-65 On-Ramp	Basic				F	107.6	0.86
BUS-65 On-Ramp	Merge				E	70.4	1.12
Republic Rd On-Ramp	Merge				D	30.8	1.22
US-65 Off-Ramp	Diverge				D	29.2	1.22
US 60 West Corridor - Westbound							
US-65 NB On-Ramp	Merge	D	28.2	0.71			
Between S Glenstone Off-Ramp and On-Ramp	Basic	D	27.7	0.76			
S Glenstone On-Ramp	Merge	D	28.7	0.86			
I-44 Corridor - Eastbound							
MO-13 On-Ramp	Merge				D	29.1	0.73
Between MO-13 On-Ramp and Glenstone Off-Ramp	Basic				D	26.4	0.73
Glenstone Off-Ramp	Diverge				D	28.5	0.73
Glenstone On-Ramp	Merge				D	29.9	0.73
Between Glenstone On-Ramp and US-65 SB Off-Ramp	Basic				D	26.3	0.73
US-65 SB Off-Ramp	Diverge				D	29.0	0.73
US-65 NB On-Ramp	Merge				D	28.2	0.71
I-44 Corridor - Westbound							
Between US-65 On-Ramp and Glenstone Off-Ramp	Basic				D	26.0	0.72
Glenstone Off-Ramp	Diverge				D	32.6	0.72
Glenstone On-Ramp	Merge				D	31.3	0.79
Between Glenstone On-Ramp and MO-13 Off-Ramp	Basic				D	29.3	0.79
MO-13 Off-Ramp	Diverge				D	30.5	0.79
MO-13 On-Ramp	Merge				D	28.7	0.70
West Bypass Off-Ramp	Diverge				D	28.3	0.70

LOS = Level of Service | D/C = demand-to-capacity ratio

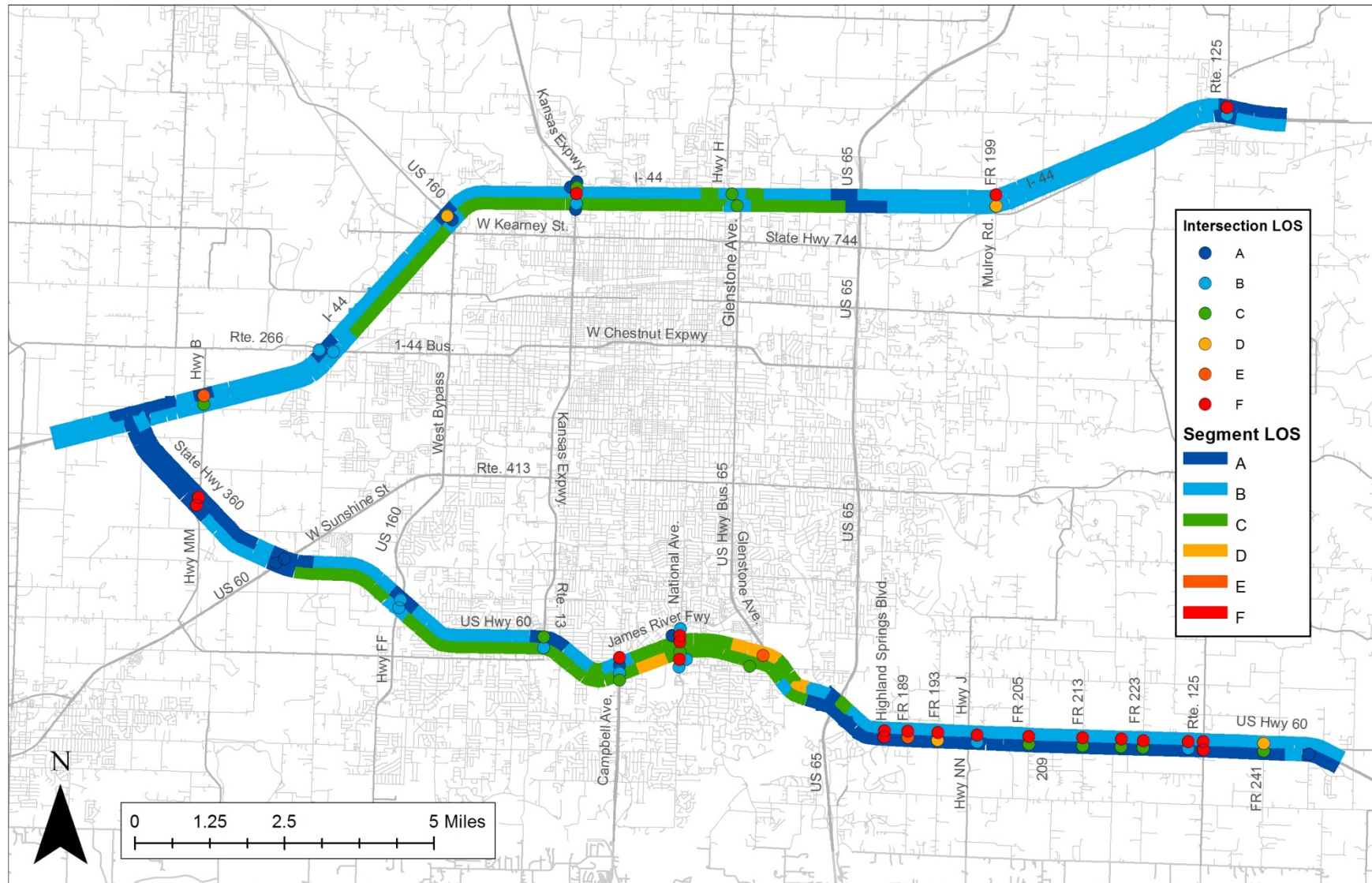
Table 4: 2040 Intersections Experiencing LOS D or Worse

		AM		PM	
Syn_ID	Intersection	LOS	Delay (s/veh)	LOS	Delay (s/veh)
US 60 West Corridor					
118*	US 60 WB Ramps & Hwy MM	F	64.3	E	42.4
115*	US 60 EB Ramps & Hwy MM	F	319.1	F	82.2
31	Campbell Ave & Republic Rd	F	99.4	F	268.1
64	US 60 & National Ave WB Off-Ramp Left	F	1168.5	F	238.7
66	US 60 & National Ave North DDI Intersection	F	89.4	F	149.3
62*	US 60 & National Ave EB On-Ramp			F	225
79	US 60 & National Ave South DDI Intersection	F	148.6	E	76.8
81	US 60 & National Ave EB Off-Ramp Right			D	43.5
46	US 60 WB Ramps & Glenstone Ave	E	59	F	151
43	US 60 EB Ramps & Republic Rd/Glenstone Ave			D	47.8
US 60 East Corridor**					
5/6*	US 60 & Highland Springs Blvd	F	103.2	F	2249.6
8/9*	US 60 & Farm Rd 189	F	1219.6	F	553.8
12/13*	US 60 & Farm Rd 193	F	862.8	F	493.5
60*	US 60 WB Ramps & Route NN/J	F	93.4		
16/17*	US 60 & Farm Rd 205	F	80.2	F	123.1
20/21*	US 60 & Farm Rd 213	F	85.5	E	42.1
24/25*	US 60 & Farm Rd 219	F	180.5	F	50
29/30*	US 60 & Farm Rd 223	F	275.2	D	33.2
33/34*	US 60 & Farm Rd 229	F	192.2	D	28.1
36/37	US 60 & Hwy 125	F	1791.9	F	363.1
40/41*	US 60 & Farm Rd 241	D	26.8		
I-44 Corridor					
117*	I-44 WB Ramps & Hwy MM	E	38	F	244.6
113*	I-44 EB Ramps & Hwy MM			D	30.2
85	I-44 WB Ramps & West Bypass	D	41.3		
67	I-44 & Route 13 WB Off-Ramp Left	F	74.3		
26*	I-44 WB Ramps & N Mulroy Rd	F	174.6	F	508
17*	I-44 EB Ramps & N Mulroy Rd	D	28.8		
8*	I-44 WB Ramps & Hwy 125	F	7458	F	1695.9

*At unsignalized intersections, LOS and Delay for the worst movement is shown.

** In the Synchro files, at-grade intersections were coded as two separate intersections (a north and south couplet); however, for the purposes of this table, each couplet is shown on one line and the worst results among the two intersections are shown for each peak.

Figure 10: 2040 No-Build Mainline & Intersection Levels of Service – AM Peak Hour



Intersection LOS

- A
- B
- C
- D
- E
- F

Segment LOS

- A
- B
- C
- D
- E
- F

0 1.25 2.5 5 Miles

Map showing the I-44 corridor in Kansas, with segments color-coded by Level of Service (LOS) and intersections marked with colored dots indicating their LOS. The map includes a scale bar (0 to 5 miles) and a north arrow.

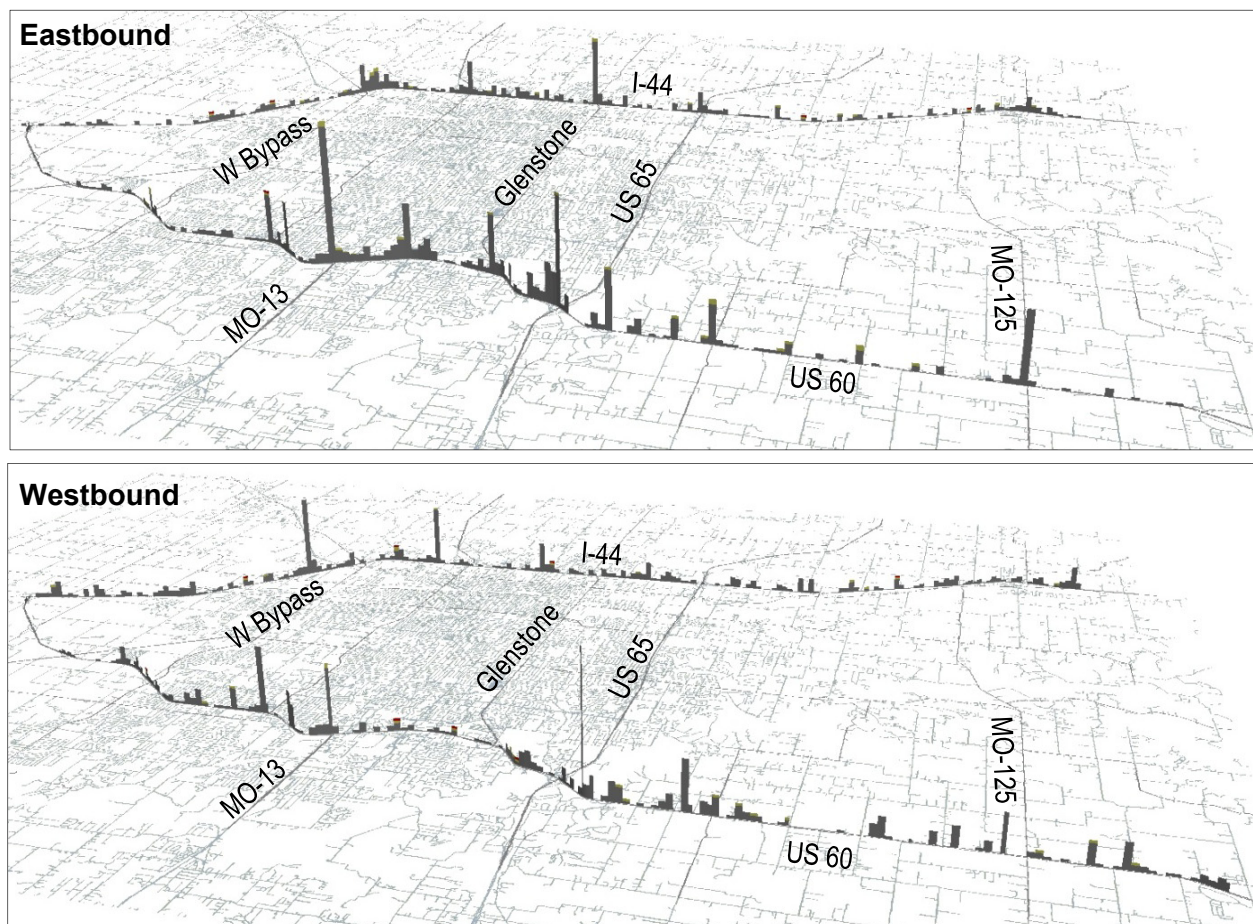
Safety Assessment

Crash data was obtained for the five-year period from 2012 through 2016 for each of the study corridors. Mainline crash totals for each corridor are displayed in **Table 5** below. Distributions of those crashes along each corridor are shown in **Figure 12**.

Table 5: Total Mainline Crashes (2012-2016)

	2012	2013	2014	2015	2016	Total
US 60 West						
Eastbound	120	112	92	79	70	473
Westbound	115	76	59	73	58	381
US 60 East						
Eastbound	27	18	24	34	33	136
Westbound	29	22	22	32	43	148
I-44						
Eastbound	97	98	87	70	85	437
Westbound	104	98	110	98	92	502
Grand Total	492	424	394	386	381	2,077

Figure 12: Crash Distribution



Corridor crash rates along I-44 and US 60 were developed. Those rates were then compared to the statewide average rate for similar freeways during the same time period. The resulting Safety Ratio indicates whether the study corridors are better (<1.0) or worse (>1.0) than the statewide average. Segments shown in yellow, orange, and red on **Figure 13** have been found to exceed the statewide average. These are also shown in **Table 6** below.

Table 6: Segments with a Safety Ratio > 1.0

	Segment Begin	Segment End	Average Crash Rate (crashes per 100 MVM*)	Safety Ratio
US 60 West				
EB	Kansas Expy	Campbell Ave	158.78	1.78
EB	Campbell Ave	National Ave	95.11	1.04
EB	National Ave	Glenstone Ave	99.82	1.11
EB	Glenstone Ave	US 65	121.52	1.79
WB	End of Corridor	US 65	128.35	1.40
WB	Glenstone Ave	National Ave	131.20	1.49
US 60 East				
EB	Start of Corridor	Farm Rd 189	198.60	2.18
EB	Hwy J/NN	Farm Rd 205	105.10	1.18
WB	Farm Rd 241	Rte. 125	94.28	1.03
WB	Farm Rd 213	Farm Rd 205	93.16	1.04
WB	Hwy J/NN	Farm Rd 189	91.47	1.02
WB	Farm Rd 189	Start of Corridor	102.10	1.12
I-44				
EB	Rte. 266	West Bypass	116.52	1.28
WB	End of Corridor	Rte. 125	98.60	1.09
WB	Glenstone Ave	Kansas Expwy	91.83	1.04
WB	Rte. 266	Hwy B/MM	111.57	1.24
WB	Hwy B/MM	US 60	109.86	1.24

*MVM = million vehicle-miles

Intersections along each of the corridors were also evaluated for safety. A total of 936 crashes occurred at intersections during the five-year analysis period. Intersection crashes per study corridor and by year are shown in **Table 7**.

Table 7: Crash Totals at Study Intersections, by Study Corridor

	2012	2013	2014	2015	2016	Total
US 60 West	88	64	58	50	86	346
US 60 East	55	36	45	54	58	248
I-44	80	86	47	66	63	342
Total	223	186	150	170	207	936

A five-year crash rate was calculated using the number of crashes within each intersection's area of influence and the number of entering vehicles (count data from 2016). Locations with a calculated value of 1.0 or greater are shown as orange and red in **Figure 13**, and are listed in **Table 8**.

Table 8: Intersections with Crash Rate > 1.0

Location	Total Crashes	Crash Rate (per MEV*)
US 60 East		
US 60 & Hwy 125	76	1.32
I-44		
I-44 EB Ramps & Chestnut Expwy	27	1.17
I-44 WB Ramps & West Bypass	58	1.71
I-44 EB Ramps & West Bypass	43	1.23
I-44 WB Ramps & Kansas Expwy	62	1.59
I-44 EB Ramps & Kansas Expwy	47	1.24
I-44 WB Ramps & Glenstone Ave	38	1.11

*MEV = million entering vehicles

5 YR Crash Rate / 1.0 Crashes per MEV

- < 0.50
- 0.51 - 0.70
- 0.71 - 1.00
- 1.01 - 1.50
- 1.51 - 1.71

5 YR Crash Rate / 5 YR State Freeway Crash Rate

- < 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.18

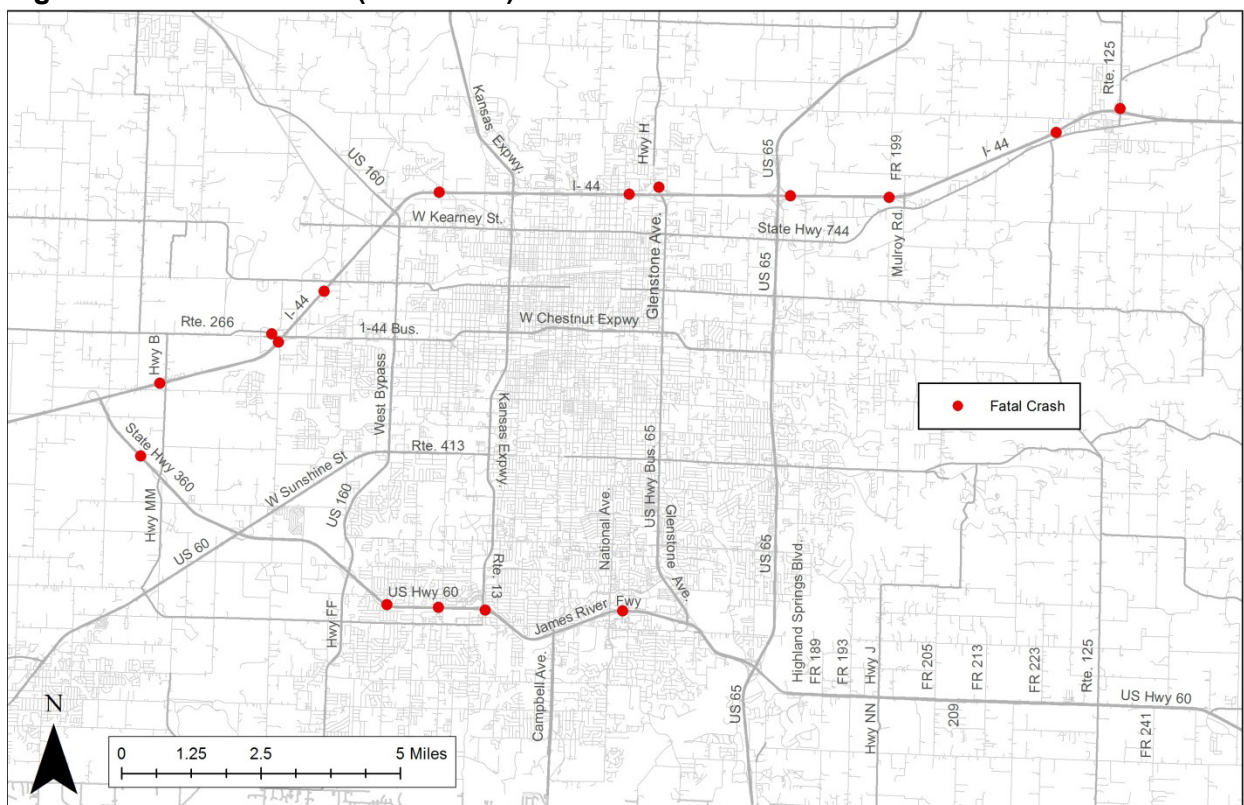
0 1.25 2.5 5 Miles

Crash severity was assessed along each corridor. **Table 9** summarizes the total crashes for each corridor by severity. During the five-year analysis period, a total of 11 fatal crashes were recorded along the I-44 corridor, of which 8 occurred along the mainline and 3 occurred at intersections. Along the US 60 West corridor, an additional 5 fatal crashes were recorded, all on the mainline. There were no fatalities recorded along the US 60 East corridor. **Figure 14** displays the locations of all reported fatal crashes.

Table 9: Crash Severity

Corridor	Fatal	Disabling Injury	Minor Injury	Property Damage Only	Total
Mainline Crashes					
US 60 West	5 (1%)	19 (2%)	255 (30%)	575 (67%)	854
US 60 East	0 (0%)	20 (7%)	65 (23%)	199 (70%)	284
I-44	8 (1%)	24 (3%)	195 (21%)	712 (75%)	939
All Corridors	13 (1%)	63 (3%)	515 (25%)	1,486 (71%)	2,077
Intersection Crashes					
US 60 West	0 (0%)	5 (2%)	115 (33%)	226 (65%)	346
US 60 East	0 (0%)	15 (6%)	61 (25%)	172 (69%)	248
I-44	3 (1%)	9 (3%)	87 (25%)	243 (71%)	342
All Corridors	3 (0%)	29 (3%)	263 (28%)	641 (69%)	936

Figure 14: Fatal Crashes (2012-2016)



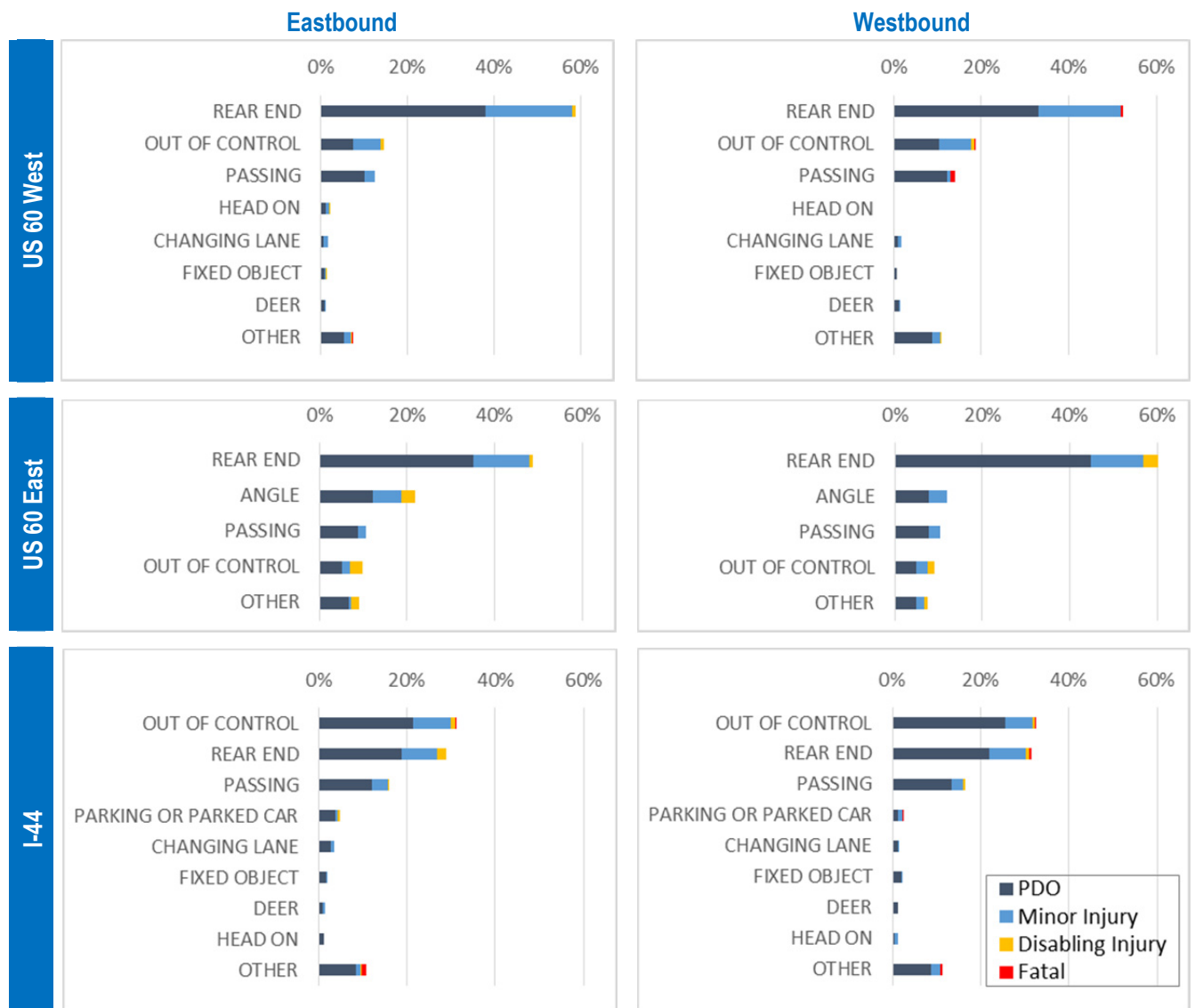
Crash types and contributing circumstances were obtained for crashes that occurred along the study corridor mainlines and analyzed for trends. See the graphs in **Figure 15** for crash type/contributing circumstance information by severity for all three study corridors.

Along the US 60 West Corridor, the predominant crash type experienced over the five-year crash analysis period was rear-end crashes. In the eastbound direction, rear-end crashes made up 59% of crashes, while in the westbound direction 53% were rear-end crashes. The likely cause of rear end crashes on a facility such as this, where there are no at-grade intersections, is due to unexpected traffic slow-downs due to congestion or road curvature. Other common crash types/contributing circumstances include out-of-control crashes (15% eastbound, 19% westbound) and passing crashes (13% eastbound, 14% westbound). These types of crashes are not uncommon for freeway-type facilities.

Along the US 60 East Corridor, the predominant crash type is the rear-end crash (49% eastbound, 61% westbound). The difference between this corridor and the US-60 West corridor is that most of the intersections are at-grade. Therefore, many of the rear-end crashes may be attributable to vehicles slowing down to make turns. The next most common crash type is angle crashes (22% eastbound, 12% westbound), which would also be attributable to the presence of at-grade intersections.

Along the I-44 Corridor, the most common crash type is out-of-control crashes (31% eastbound, 32% westbound) followed closely by rear end crashes (29% eastbound, 32% westbound). Like the US 60 West Corridor, the I-44 corridor is an access-controlled facility, and rear-end crashes are likely attributable to traffic slowdowns. Out-of-control crashes can be caused by a number of things but could include driver over-correction due to roadway curvature. Uncontrollable circumstances such as poor weather conditions and speeding can also contribute to these types of crashes.

Figure 15: Crash Type/Contributing Circumstance



Roadway Assessment

To perform the roadway assessment of the three study corridors, existing pavement maintenance plans and as-built drawings were provided by MoDOT. In addition, a site visit was conducted along each corridor and aerial photography was used to help supplement the analysis. The analysis primarily assessed horizontal alignments and superelevations, vertical alignments, ramp geometrics, acceleration/deceleration lengths, clear zone obstructions, and stopping sight distances.

The mainline horizontal curvature was assessed as to whether its operational speed matched its design speed. In a number of locations this was found to not be the case, as shown highlighted in solid orange and red on **Figure 16**. This is particularly true along the US 60 West Corridor, which has several horizontal curves. There are six locations where the operational speed is more than 15 mph slower than the design speed, and another eight locations where the operational speed is 5 to 10 mph slower than the design speed. The US 60 East Corridor, which in comparison to the west corridor is very straight, does not have any horizontal curves that operate at speeds slower than design speeds. The I-44 Corridor has just a few problem locations: two curves that operate more than 15 mph below design speed, and one curve that operates 5-10 mph below design speed.

Mainline vertical curvature was also assessed as to whether its operational speed matched its design speed. Curves where the operational speed was found to be below the design speed are shown as dashed orange and red on **Figure 16**. Both the US 60 West Corridor and the I-44 Corridor are fairly flat and each have only one vertical curve segment that operates below design speed. The majority of the westbound lanes of the US 60 East Corridor, however, operate at speeds below the design speed due to the vertical curvature.

The operational speed at each interchange ramp was also assessed versus the design speeds. At almost every interchange along all three corridors, there is at least one ramp that operates below design speeds. These are shown with orange and red dots on **Figure 16**.

The acceleration and deceleration lengths for each interchange ramp were analyzed and compared to Tables 10-3 and 10-5 in the 2011 AASHTO Green Book to determine if the lengths match or exceed requirements. At most of the interchanges along the three corridors, there is at least one ramp with acceleration or deceleration lengths less than what is required. Many are more than 200 feet shorter than what is required. Deficient lengths are shown with orange and red bars on **Figure 17**.

Each corridor was assessed for clear zone obstructions. The required size of the clear zone is generally determined by the traffic volumes and speeds along the roadway. For the three study corridors, the assumed clear zone was 34 feet. As shown in **Figure 17**, a number of obstructions were observed along each of the corridors. On the I-44 Corridor, the obstructions appear to be clustered around the MO Hwy 13/Kansas Expressway and Glenstone Avenue interchanges. Along the US 60 Corridors, the infractions are more spread out. Obstructions in the clear zone can include overhead signage, other fixed objects, steep embankment and/or cut slopes, and high fills, but in the case of this study primarily included tall rock outcroppings.

Intersection sight distances were analyzed along the US 60 East Corridor. Sight triangles, areas that should be free of obstructions that block a driver's view of potentially conflicting vehicles, were determined for the appropriate speeds and volumes along the corridor. There are currently four locations where the intersection sight distances do not meet criteria, due to obstructions within the required sight triangles or due to the vertical curvature of the roadway. The problem locations along US 60 are at its intersections with Highland Springs Boulevard, Farm Road 193, Farm Road 213, and Farm Road 223, as shown in **Figure 17**. The US 60 West and I-44 Corridors do not have any at-grade intersections, and intersections at ramp terminals were not included in this analysis.

Items such as drainage, signing, lighting, guardrail/guard cable, and barrier were reviewed with respect to how they might need to be installed and/or upgraded to the latest standard with a proposed improvement project in the immediate vicinity. There is a drainage issue on the US 60 East Corridor near Farm Road 213 that would require a grade raise of the westbound lanes should a proposed freeway section be implemented. There are also several ongoing guardrail projects along the US 60 West Corridor that involve upgrading existing guardrail to the current Midwest Guardrail System standard.

Figure 16: Horizontal and Vertical Geometry

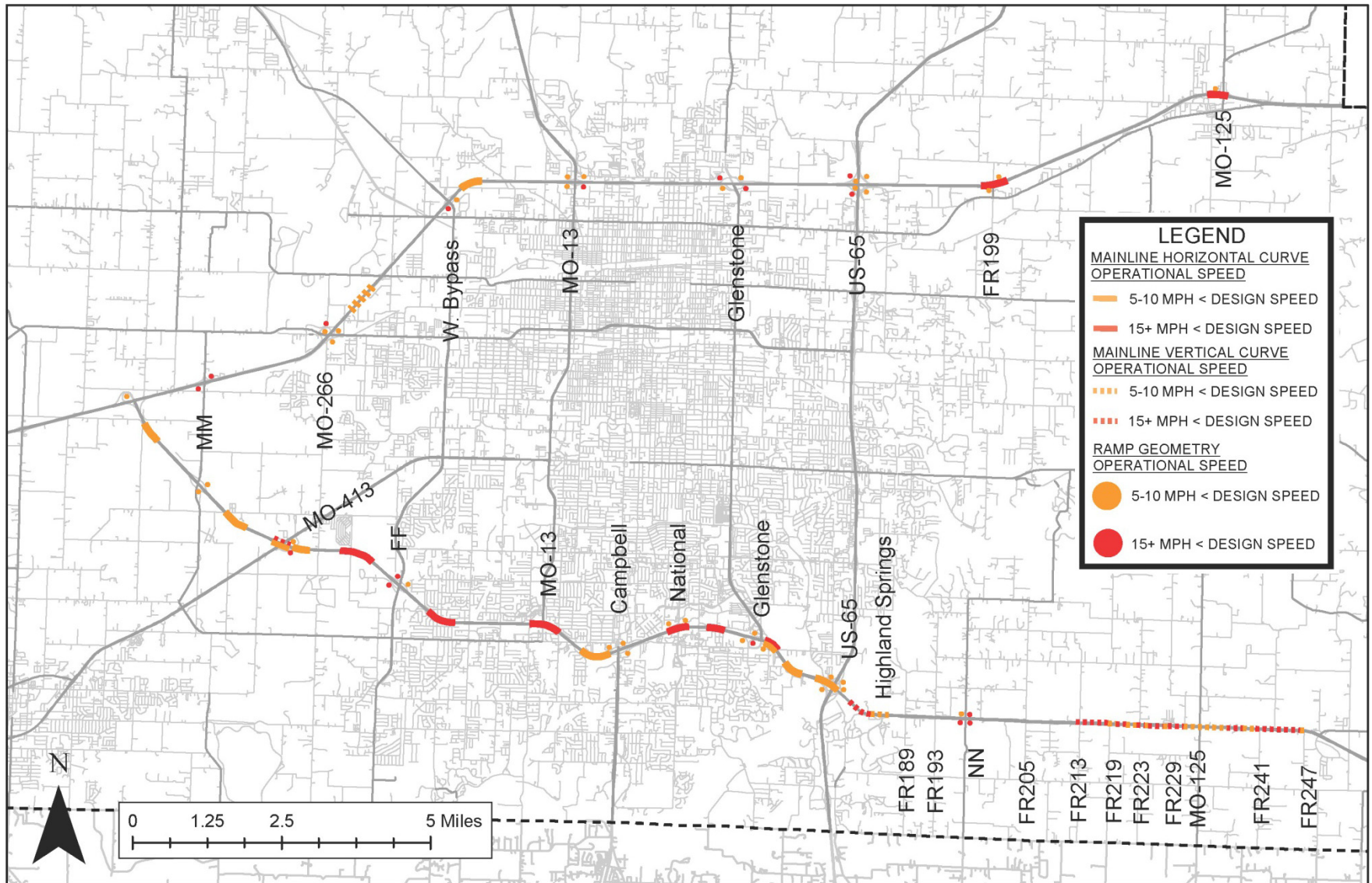
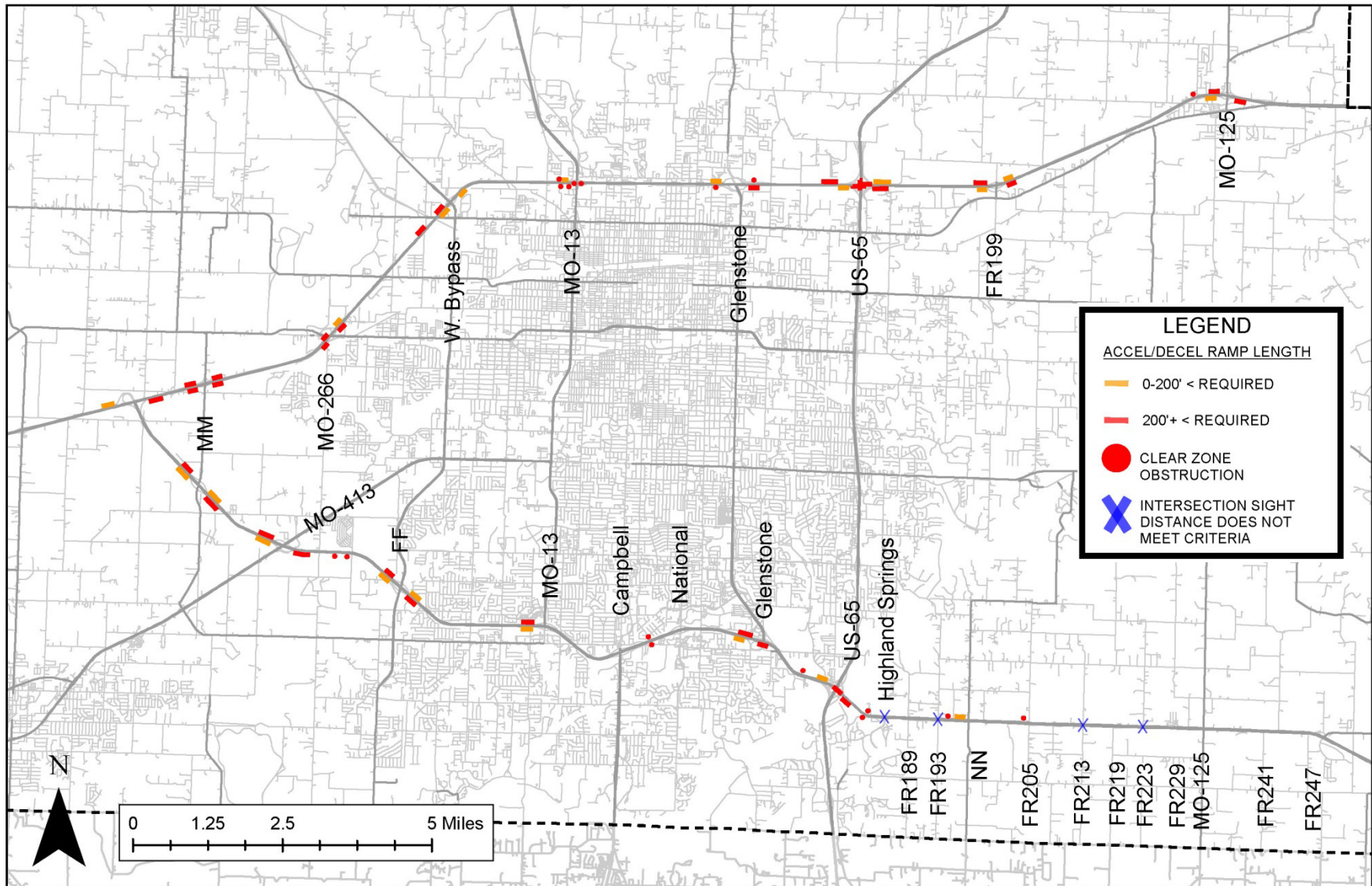


Figure 17: Roadway Safety and Operational Issues



Bridge Assessment

Existing bridge inspection reports were obtained from MoDOT and reviewed for each bridge along the three study corridors. Items considered in the overall bridge rating include the bridge deck (the surface on which vehicles travel), the superstructure (which transfers the load of the deck and the bridge traffic to the substructure), and the substructure (which provides support for the entire bridge). **Table 10** provides the bridge rating scale and a description for each category as provided by FHWA.

Table 10: Bridge Condition Rating Categories

Rating	Condition Category	Description
9	Excellent	
8	Very Good	No problems noted.
7	Good	Some minor problems.
6	Satisfactory	Structural elements show some minor deterioration.
5	Fair	All primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
4	Poor	Advanced section loss, deterioration, spalling, or scour.
3	Serious	Loss of section, deterioration, spalling, or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
2	Critical	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored, it may be necessary to close the bridge until corrective action is taken.
1	Imminent Failure	Major deterioration or section loss present in critical structural components, or obvious loss present in critical structural components, or obvious vertical or horizontal movement affecting structural stability. Bridge is closed to traffic, but corrective action may be sufficient to put the bridge back in light service.

Source: FHWA

None of the bridges along any of the three study corridors has a Poor or worse rating on the FHWA scale. There are two bridges that currently have a Fair rating and both are along the I-44 Corridor. One is the Farm Road 127 overpass, and the other is the US 65 southbound bridge over I-44. Along I-44 there are also four bridges with a Satisfactory rating. All remaining I-44 bridges are rated Good or better. Along the US 60 West Corridor three bridges have a Satisfactory rating, while the remaining have a Good or better rating. The US 60 East Corridor bridges are rated Good or better. **Figure 18** shows the overall condition rating for all of the existing bridges.

In addition to the overall bridge ratings, individual ratings for each bridge deck, superstructure, and substructure were observed to determine whether there were specific deficiencies in one of those elements that may need to be addressed. **Figures 19-21** show these individual ratings. As with the overall rating, there are no individual elements that currently have a Poor or worse rating.

Figure 18: Overall Condition of Existing Bridges

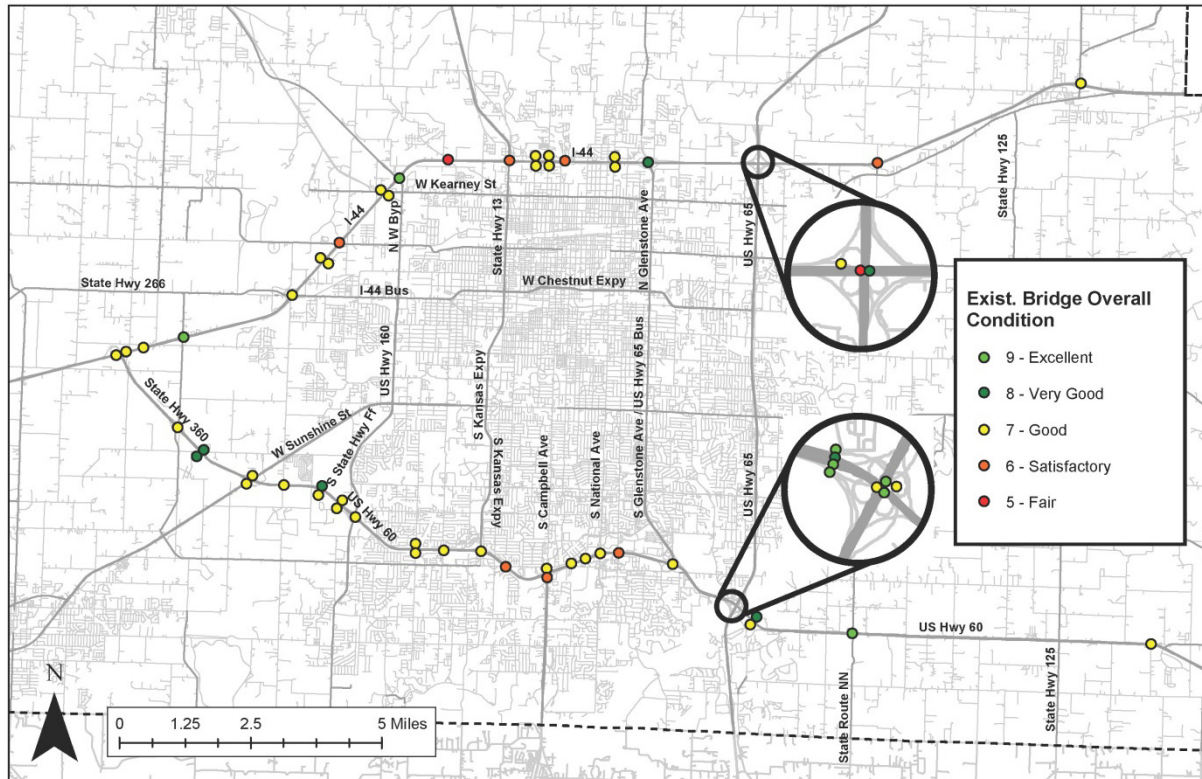


Figure 19: Existing Bridge Deck Ratings

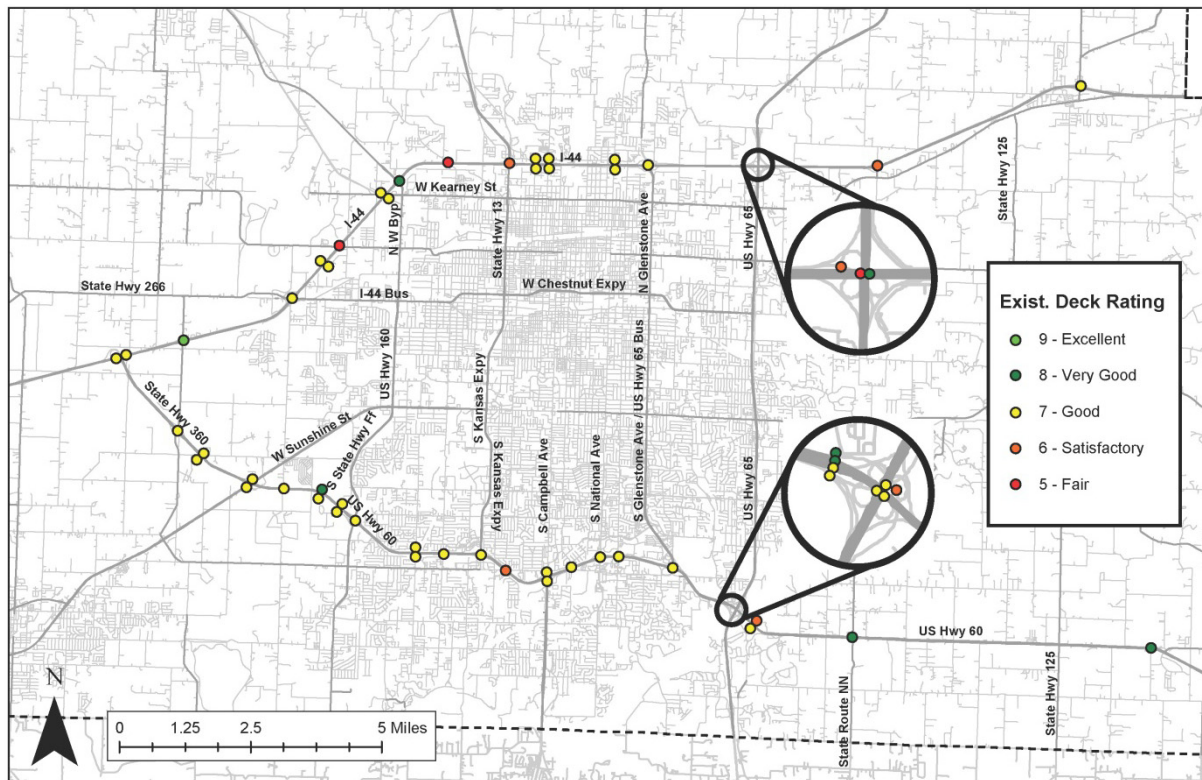


Figure 20: Existing Bridge Superstructure Ratings

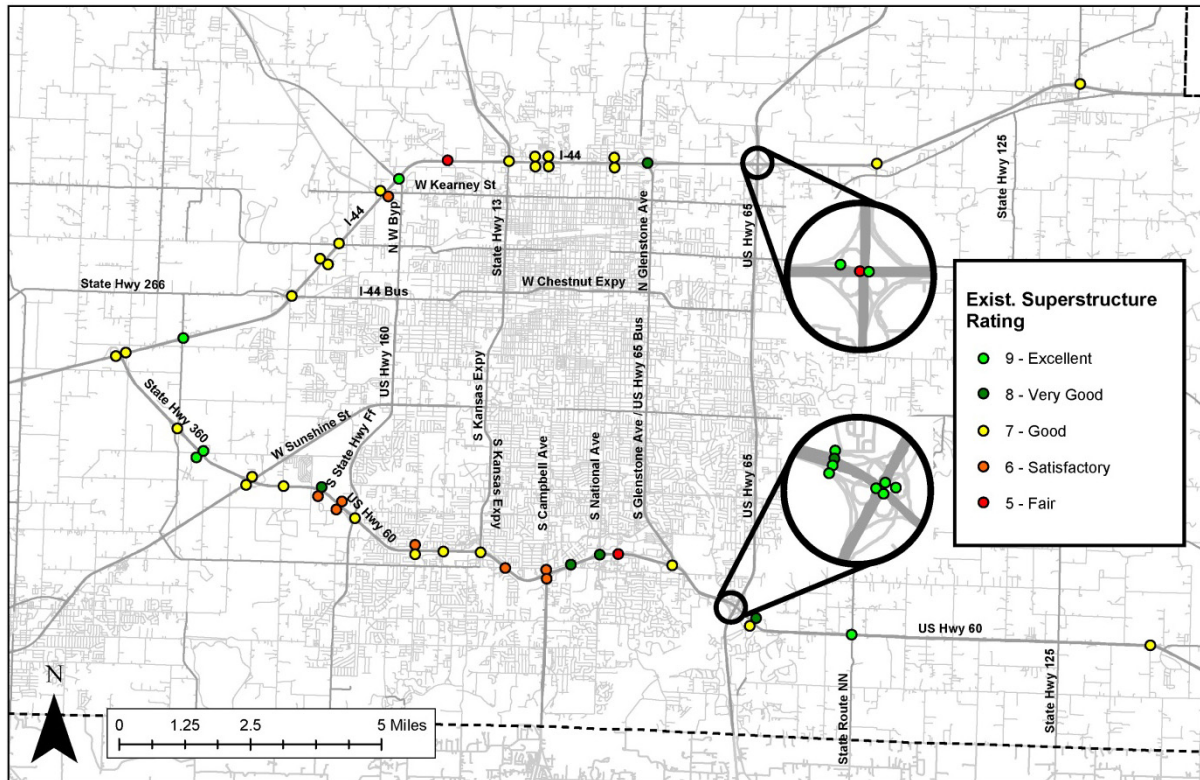
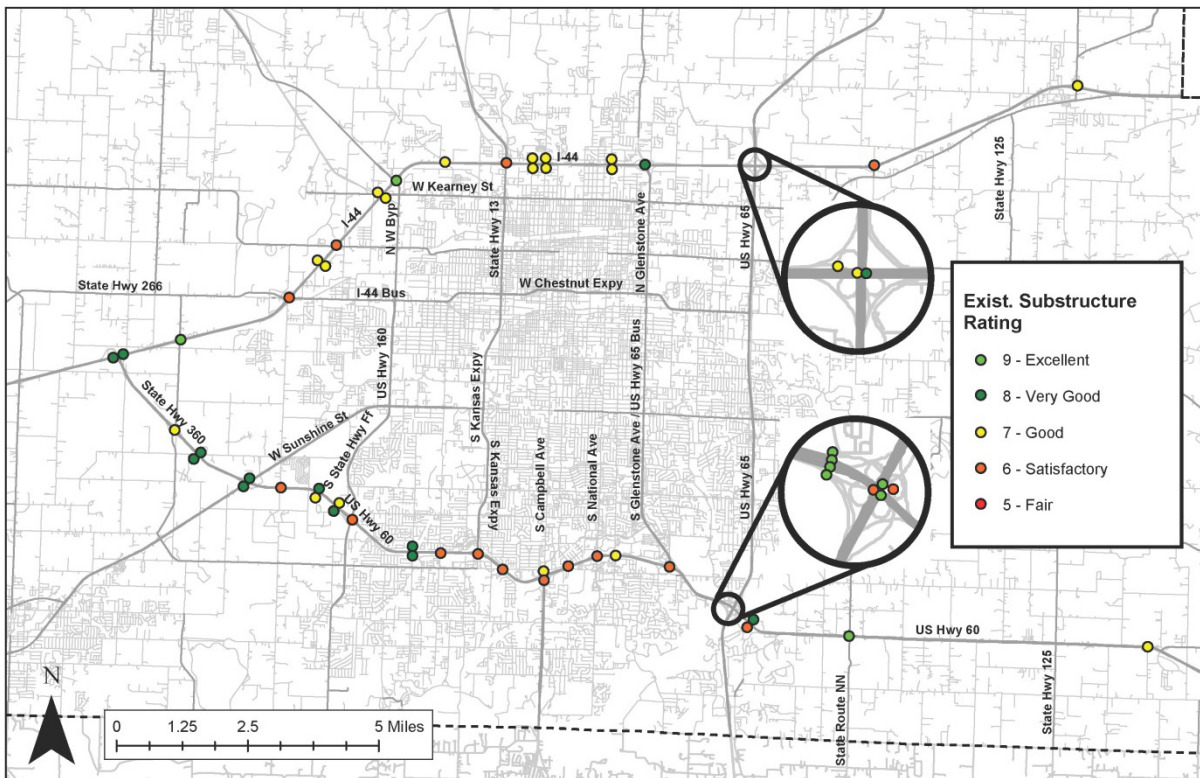


Figure 21: Existing Bridge Substructure Ratings



Project Development

Evaluation Process

Utilizing the outputs of the existing and future no-build conditions analysis, a list of projects was developed. In particular, the operational assessment provided levels-of-service (LOS) that were used to identify capacity deficiencies. In regards to freeway capacity, the HCM methodology was used (through FREEVAL) to determine locations with capacity deficiencies. Freeway LOS is based on density, in terms of passenger cars per mile per lane (which is subsequently related to speed and flow). For LOS D or better, the flow rate (or capacity) of a freeway lane at 65 MPH is approximately 2,000 pcphpl. HCM indicates that auxiliary lane capacity can be as low as half of a freeway lane's capacity for segments shorter than 3,000 feet, but only slightly reduced from 2,000 pcphpl for longer segments. In segments with two mixed-flow lanes and one auxiliary lane, capacities can range from 5,000 pcphpl up to nearly 6,000 pcphpl before the freeway segment reaches LOS E. Segment length and the volume of merging and diverging movements affect the capacity of an auxiliary lane. Freeway segments and intersections experiencing LOS D or worse in 2017 or 2040 were considered for improvements. In addition, the historical crash data analysis provided crash rates, which were used to identify locations with safety concerns. Freeway segments and intersections with a crash rate greater than 1.0 were considered for improvements. At these locations, crash types were further evaluated for patterns and deficiencies that were correctable through geometric design and traffic control measures.

Roadway and bridge deficiencies were considered when identifying projects based on poor LOS and high crash rates. Projects were not developed on the basis of roadway and bridge deficiencies alone, but the correction of such deficiencies was included in projects as appropriate.

Other identified operational deficiencies – primarily excessive queue lengths at ramp terminal intersections – were also considered for improvements. Excessive queue lengths on freeway off-ramps contribute to an increased frequency of crashes and a reduction in safety on the ramp and freeway. These identified locations were not experiencing a poor LOS or high crash rate; however, the traffic volumes, lane loading, and queue lengths were determined to justify the need for improvements.

Table 11 lists the 20 projects that were identified through this process. Brief descriptions of each project, as well as the identified capacity and/or crash issues, are also provided. Appendix F contains detailed exhibits for each project.

It should be noted that the scopes of each project identified in this report should include, during the actual project development phase, consideration for items to accommodate additional future growth beyond the 2040 horizon – as reasonable – such as right-of-way acquisition/preservation for future lane or roadway additions.

One issue discussed and considered by the study team, for both the I-44 and US-60 West corridors, was adding auxiliary lanes vs. widening to provide three basic through lanes in each direction. The study team found the following:

- Based on the operational analysis, much of the perceived congestion along both corridors is due in large part to heavy merging, diverging, and weaving volumes or existing capacity issues at ramp terminal locations, such as the eastbound left-turn or westbound right-turn at US-60 and National Avenue.
- One indicator of the need for additional basic through capacity need is the traffic volumes between the off-ramps and on-ramps of a given interchange, because they are free of any movements related to that interchange. Along the busiest part of the US-60 West corridor, such volumes range from approximately 2,500 vph to 4,200 vph. The capacity of a single lane at freeway speeds is approximately 2,400 vph. Although the projected volumes are nearing this capacity by 2040, they are still below the threshold (with the exception of the Glenstone Avenue interchange, for which the study team developed an operational solution). Through volumes on I-44 are lower and thus also fall below the threshold.
- Capacity analyses performed for this study indicate that auxiliary lanes and capacity/storage enhancements at ramp junctions are expected to adequately accommodate traffic through projected 2040 conditions.
- While six basic through lanes (three per direction) would provide significant capacity improvements through the corridors, it would come at a higher cost than installing auxiliary lanes – which, as described above, provide similar benefits. Since I-44 and US-60 have relatively wide median sections, the most economical place to widen for a new basic through lane would be to the inside. Widening to the inside would also maintain more of the recent auxiliary lane investments, and any new auxiliary lanes would not be “throwaway” projects when the time came for widening to six basic lanes. Therefore, installing auxiliary lanes is a very logical first step to enhancing capacity along the corridors. Auxiliary lanes address the needs through at least 2040 based on the analysis of this report. As described earlier in the section on “2020 No-Build Analysis”, future periodic reviews of the travel demand model are needed to update growth rates and continue to guide prioritization of regional needs. Widening to six basic lanes will likely ultimately be needed, just not within the time horizon of this study.

Once identified, the geometric modifications associated with each project were then coded into Synchro and/or FREEVAL, as applicable, and analyzed for both the baseline (2018) and future forecasted (2040) volume scenarios. The results of these “Build” analyses were then compared to the No-Build results for the same years. This process helped to prioritize the projects, as described in more detail in the Prioritization section of this document.

Cost Estimates

For each of the identified projects, a conceptual engineer's opinion of probable construction cost was developed. This included all grading and drainage costs, pavement base and surface costs, bridge costs, and miscellaneous costs (such as signage, signals, lighting, guardrail, etc.) Other estimated amounts for design, survey, utility relocation, right-of-way, and contingency were included as well. **Table 11** includes the total estimated cost for each project. For the details of the cost estimates, see Appendix G.

Table 11: Project Development List

Proj #	Project Location / Cost	Project Description	2040 LOS Issues	Crash/Other Issues
60W-1	US 60 from west of Glenstone Avenue to the US 65 on-ramp \$16,781,000	Provide an eastbound braided ramp roadway for direct access to the US 65 ramp and provide a Diverging Diamond Interchange (DDI) at Glenstone to reconfigure access to US 60. Project should be coordinated with City's future Republic Road extension plans.	Glenstone North Ramp: LOS (AM: E, PM: F) Mainline, Glenstone-US 65: LOS (EB PM: D-E) Mainline, US 65-Glenstone: LOS (WB AM: D)	Mainline, National - US 65: High crash rate
60W-2	US 60/360 at Hwy MM \$934,000	Signalize and add left-turn lanes at both ramp terminals.	North Ramp: LOS (AM: F, PM: E) South Ramp: LOS (AM/PM: F)	--
60W-3	US 60 at Sunshine Street (Route 413) \$4,846,000	Convert interchange to a DDI and relocate nearby drive access west of the interchange.	Initial analysis identified potential LOS issues, but refined analysis did not. Project was removed from further consideration.	--
60W-4	US 60 at West Bypass (Route FF / US 160) \$4,936,000	Convert interchange to a DDI and relocate nearby drive access west of the interchange.	Initial analysis identified potential LOS issues, but refined analysis did not. Project was removed from further consideration.	--
60W-5	US 60 at US 65 \$870,000	Extend the westbound-to-southbound deceleration ramp and the southbound-to-eastbound acceleration ramp.	--	SB-to-EB loop ramp: Substandard acceleration length entering US-60
60W-6	US 60 at National Avenue \$1,248,000	Add a 3rd left-turn lane at the eastbound off-ramp, add a third right-turn lane at the westbound off-ramp, and provide a mainline option exit lane to the eastbound off-ramp.	North Ramp: LOS (AM/PM: F) South Ramp: LOS (AM: F, PM: E)	EB mainline, Campbell-Glenstone: High crash rate WB mainline, National-Glenstone: High crash rate
60E-1	US 60 at Route 125 \$14,263,000	Convert at-grade signalized intersection to a grade separated interchange with double "peanut" roundabouts.	Intersection: LOS (AM/PM: F)	Intersection: High crash rate WB mainline east of intersection: High crash rate
60E-2	US 60 from Highland Springs Boulevard to Hwy J / NN \$12,728,000	Close at-grade intersections and construct new outer roads and new freeway roadways, and signalize the westbound off-ramp at the Highway J / NN interchange.	Intersections: LOS (AM/PM: F) J / NN North Ramp: LOS (AM: F)	WB mainline west of intersection: High crash rate EB mainline, Highland Springs - FR 189: High crash rate
60E-3	US 60 at Farm Road 189 \$24,908,000	Convert at-grade intersection to a grade-separated interchange. Close at-grade intersections, and construct new outer roads and new freeway segments from Highland Springs Boulevard to Highway J / NN interchange. Signalize the westbound off-ramp at the Highway J / NN interchange.	Intersection: LOS (AM/PM: F) J / NN North Ramp: LOS (AM: F)	WB mainline east/west of intersection: High crash rate EB mainline, Highland Springs - FR 189: High crash rate
60E-4	US 60 from Hwy J / NN to just east of Farm Road 213 \$15,277,000	US 60 from Hwy J / NN to just east of Farm Road 213 – Close at-grade intersections and construct new outer roads and new freeway roadways.	Intersections: LOS (AM/PM: Range from E to F)	WB mainline west of FR 213 intersection: High crash rate EB mainline east of J/NN intersection: High crash rate

Proj #	Project Location / Cost	Project Description	2040 LOS Issues	Crash/Other Issues
60E-5	US 60 from just east of Farm Road 213 to Route 125 \$12,314,000	Close at-grade intersections and construct new outer roads and new freeway roadways.	Intersections: LOS (AM/PM: Range from D to F)	--
60E-6	US 60 from Route 125 to Farm Road 247 \$11,508,000	Close at-grade intersections and construct new outer roads and new freeway roadways.	Intersections: LOS (AM: D)	WB mainline east of Hwy Route 125: High crash rate
44-1	Interstate 44 from Route 13 to US 65 \$29,628,000	Provide auxiliary lanes between interchanges and provide an added 2nd right-turn lane for the westbound off-ramp at Route 13, including minor shoulder improvements at the Glenstone interchange.	Mainline, Route 13 - US-65: LOS (EB/WB PM: D) Kansas North Ramp: 2040 LOS (AM: F)	WB Mainline, Rte. 13 - Glenstone: High crash rate Glenstone WB ramp terminal: High crash rate Kansas both ramp terminals: High crash rate
44-2	Interstate 44 at Highway MM / Highway B \$4,487,000	Construct roundabouts at both ramp terminals (tie-in frontage road on the north-side) and extend all acceleration and deceleration ramps.	North Ramp: LOS (AM: E and PM: F) South Ramp: LOS (PM: D)	--
44-3	Interstate 44 at Chestnut Expressway (Route 266) \$416,000	Extend and provide positive separation for westbound acceleration lane.	--	WB mainline west of interchange: High crash rate
44-4	Interstate 44 at Kearney Street (Route 744) \$1,119,000	Extend and provide positive separation for westbound acceleration lane.	--	WB acceleration lane from Kearney St: High crash rate
44-5	Interstate 44 at West Bypass (US 160) \$678,000	Add a 2nd left-turn lane at the westbound off-ramp traffic signal and extend the eastbound deceleration and westbound acceleration lanes.	North Ramp: LOS (AM: D)	EB mainline west of interchange: High crash rate Both ramp terminals: High crash rate
44-6	Interstate 44 at US 65 \$15,072,000	Construct a southbound-to-eastbound flyover ramp and eliminate the existing southbound-to-eastbound cloverleaf ramp.	--	Cloverleaf: Substandard weave distance
44-7	Interstate 44 at Mulroy Road (Farm Road 199) \$3,465,000	Construct roundabouts at both ramp terminals (tie-in frontage road on the south-side) and extend all acceleration and deceleration ramps.	North Ramp: LOS (AM/PM: F) South Ramp: LOS (AM: D)	--
44-8	Interstate 44 at Route 125 \$1,199,000	Signalize the westbound off-ramp terminal, extend the eastbound acceleration and deceleration ramps and westbound acceleration ramp, and close the eastbound off and on-ramps at the old weigh station east of Route 125.	North Ramp: LOS (AM/PM: F)	WB mainline east of interchange: High crash rate

Prioritization

Once the projects were identified, the next step was to prioritize the list in order to determine which projects would be the best to implement in the near-term vs. which projects could be put on a longer-term schedule for when additional funding becomes available.

The prioritization was based on Benefit/Cost (B/C) ratios estimated for each recommended project. The methodology was based on standard B/C analyses used for USDOT projects, but was simplified where appropriate to efficiently conduct high-level comparisons suitable for prioritization in the Statewide Transportation Improvement Program (STIP).

The cost (C) portion of the B/C ratio was based on order-of-magnitude estimates developed as described in the previous section. Annual maintenance costs were not estimated as part of this project; they would be anticipated to be correlated with construction costs and were not needed for this comparative analysis.

The benefit (B) portion of the ratio consists of two components: (1) a delay (travel-time) component, and (2) a safety component.

Note: Two other types of benefits are often considered in B/C analyses of transportation projects: vehicle operating cost savings and emissions cost savings. Benefit estimates for these two categories are typically based on vehicle-miles traveled (VMT) and changes in speed. For the purposes of this analysis, overall VMTs are not expected to change appreciably with the improvements studied. Although speeds would be typically expected to improve with operational improvements, operating cost and emissions cost savings typically constitute a fairly small share (10-15%) of overall benefit estimates. Their inclusion would not be expected to substantially alter the results of this comparative prioritization study.

Assessing Benefits over Time

To compare all projects on an equal footing, travel-time and safety benefits were calculated for an analysis period covering 2018-2040. Essentially, each improvement was artificially assumed to be constructed in 2018 and to provide benefits until 2040 (the year for which long-term projections were available from the OTO travel demand model). This simplified analysis implicitly assumed a service life for each improvement that lasts until at least 2040. It was structured to answer the question: “Which improvement should be constructed first?” Benefits were monetized for each year, and a discount rate was applied to calculate a present value, as in the equation below:

$$\text{Present value} = \sum_{n=2018}^{2040} B_n(P/F, i, n) = \sum_{n=2018}^{2040} B_n(i + 1)^{-\Delta n} = \sum_{n=2018}^{2040} B_n(1.04)^{-\Delta n}$$

Where B_n represents the travel-time and safety benefits in year n , i is the discount rate (4%), $P/F, i, n$ is the discount factor, and Δn is the number of years “out” from 2018 (e.g., $\Delta n_{2018} = 0$, $\Delta n_{2040} = 22$).

Travel-Time Benefits

For projects that result in traffic operational improvements, these improvements were translated to person-time savings (typically delay reductions). The economic benefits were assessed through the concept of Value of Time (VOT) – more specifically, the Value of Travel Time Savings (VTTS).

The USDOT publication *Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis, September 27, 2016*¹ was a source of guidance in developing assumptions regarding VTTS.

The basic calculation can be stated as follows:

$$\text{Travel Time Benefits} = (\text{Travel Time Savings}) \times (\$ \text{ Value of Travel Time Savings})$$

Each of the two parts on the right side of the equation is discussed below.

Travel Time Savings

Annual travel time savings were calculated as the change in annual vehicle-hours traveled (VHT) associated with each operational improvement. This analysis examined two types of improvements:

- *Mainline freeway improvements:* The peak-period delay-per-vehicle results from FREEVAL were multiplied by the total number of vehicles in the study corridor during the peak period to obtain peak-period VHT.
- *Intersection improvements:* The peak-hour delay-per-vehicle results from Synchro were multiplied by the total number of vehicles entering the intersection during the peak period to obtain peak-hour VHT. For off-system intersections affected by the improvements, where counts have not been obtained, estimates were made based on data from nearby intersections for which data were available.

In both cases, VHT reductions were summed over both peak hours/periods, and multiplied by 365 to obtain an estimate of annual peak-period reduction in VHT. These annual estimates were then interpolated over the multi-year analysis period as described above.

Value of Travel Time Savings (VTTS)

Table 12 summarizes the development of VTTS values for the three study corridors. Per USDOT guidance, VTTS values for non-freight travel were divided into “Local” and “Intercity” trip types, which were further divided into “Personal” and “Business” trip purposes. For each category, factors were applied to the median hourly wage rate to determine a VTTS per person-hour. Vehicle occupancy data, in this case extracted from the OTO travel demand model, was used to convert these values to VTTS per vehicle-hour. As **Table 12** indicates, assumptions

1

<https://www.transportation.gov/sites/dot.gov/files/docs/2016%20Revised%20Value%20of%20Travel%20Time%20Guidance.pdf>

regarding the split between local and intercity trips on each corridor were used to develop final corridor-specific VTTS values.

For freight travel, no distinctions were made between local and intercity travel. A slightly higher factor was applied to the median hourly wage rate to reflect truck driver wages and benefits. Vehicle occupancies were assumed to be 1.0 for freight.

Table 12: Computation of Value of Travel Time Savings (VTTS) for the Springfield Freeway Study Corridors

		Non-Freight				Freight
		Local		Intercity		
		Personal	Business	Personal	Business	
Ratio for fringe benefits adjustment*		1.0	1.46	1.0	1.46	1.54
Estimated average total hourly compensation, MO**		\$16.46	\$24.03	\$16.46	\$24.03	\$27.81
VTTS per person-hour as % of total earnings*		50%	100%	70%	100%	100%
VTTS per person-hour		\$8.23	\$24.03	\$11.52	\$24.03	\$27.81
% of travel that is personal vs. business*		95.4%	4.6%	78.6%	21.4%	--
Blended VTTS per person-hour		\$8.96		\$14.20		\$27.81
Average Vehicle Occupancy (AVO)***		1.48		1.48		1.00
VTTS per vehicle-hour		\$13.26		\$21.02		\$27.81
Estimated % of travel type by facility (derived from counts, flow maps)	I-44	45%		28%		27%
	US-60 West	80%		15%		5%
	US-60 East	64%		31%		5%
VTTS per vehicle-hour, by facility	I-44			\$19.37		
	US-60 West			\$15.18		
	US-60 East			\$16.39		

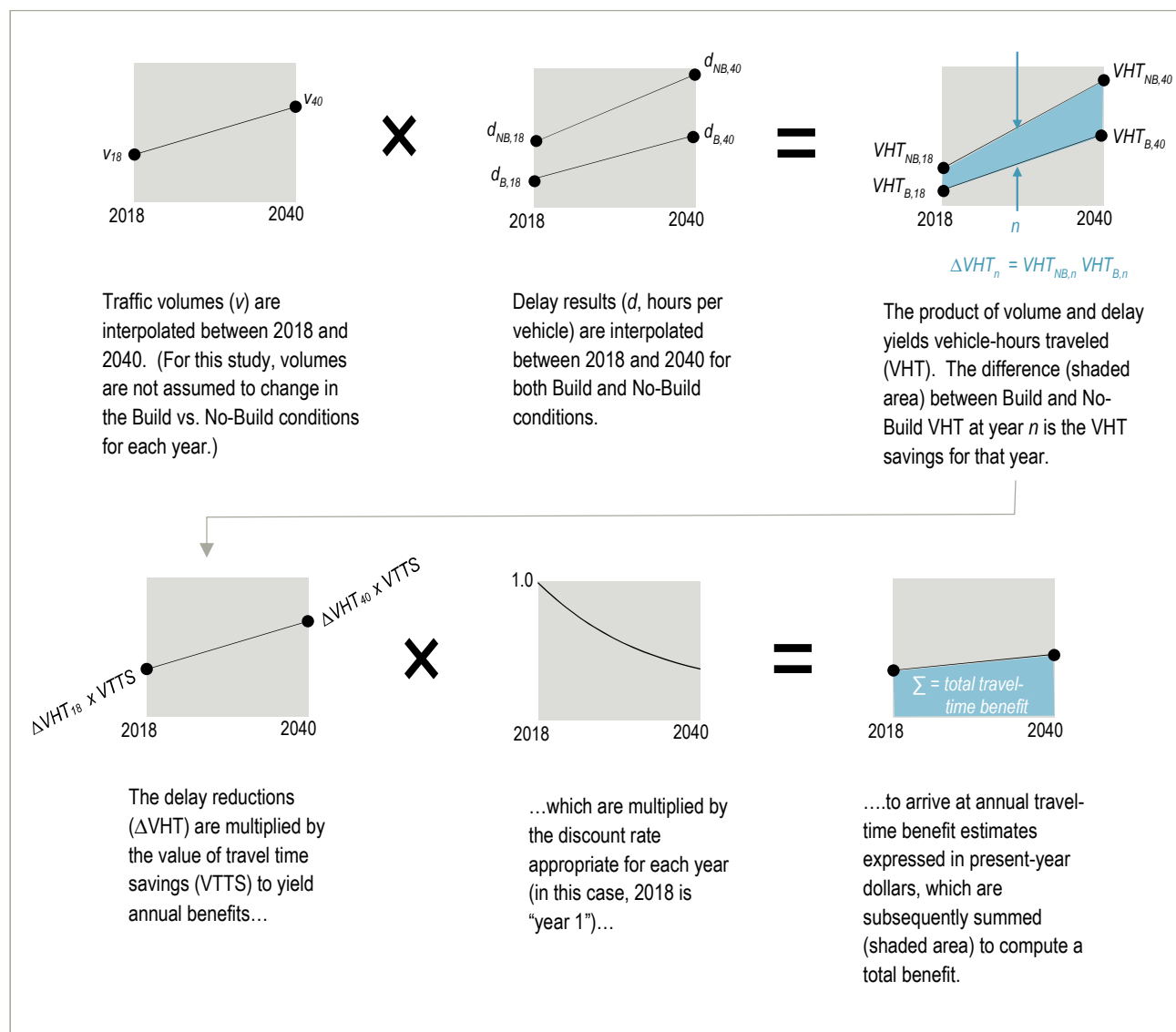
*Source: USDOT, 2016

** Non-freight based on Missouri median hourly wage of \$16.46 (May 2016, BLS); freight based on 2015 national truck-driver hourly wage of \$17.71 adjusted by 2.00% inflation to a 2016 value of \$18.06

***Source: Non-freight = OTO travel demand model, freight = NHTS

Figure 22 is a graphical illustration of how the travel-time component of these benefits was calculated.

Figure 22: Calculation of Travel-Time Benefits



Using the methodology described above, the total travel time benefit for the lifetime of each of the 20 projects is shown in **Table 13**.

Table 13: Operational Benefits

		Total Delay (veh-hrs), Both Peak hours						Project Lifetime Delay Benefit, 2018 - 2040
		2018		2040		Δ		
		No- Build	Build	No- Build	Build	2018	2040	
Project	Segment	No- Build	Build	No- Build	Build	2018	2040	
60W-1	US-60, National to US-65	273.4	99.1	901.3	195.7	-174.3	-705.6	\$14,919,410
60W-2	US-60/360, at MM	4.5	10.4	8.9	15.9	5.9	7.0	-\$504,240
60W-3*	US-60/360, at Route 413 (Sunshine)	28.2	54.2	36.0	140.6	25.9	104.6	-\$2,220,849
60W-4*	US-60, at Route FF / US 160 (West Bypass)	48.9	42.0	69.0	85.2	-6.8	-16.2	\$585,463
60W-5	US-60, at US-65	1.8	1.5	2.2	2.0	-0.2	-0.1	\$19,872
60W-6	US-60, at National	108.4	69.4	1225.3	240.6	-39.0	-984.7	\$3,337,919
60E-1	US-60, at Route 125	241.2	11.4	302.4	16.1	-229.8	-286.3	\$21,243,570
60E-2	US-60, Highland Springs to J / NN	28.4	8.5	166.6	12.3	-19.9	-154.3	\$1,843,421
60E-3	US-60, at FR 189	28.4	8.5	166.6	12.3	-19.9	-154.3	\$1,843,421
60E-4	US-60, J / NN to East of FR 213	10.6	9.4	19.3	13.4	-1.2	-5.8	\$114,927
60E-5	US-60, East of FR 213 to Rte. 125	243.5	13.6	309.3	22.1	-229.9	-287.2	\$21,253,834
60E-6	US-60, Route 125 to FR 247	241.2	13.6	301.2	22.1	-227.6	-279.1	\$21,037,503
44-1	I-44, Route 13 (KS Expwy) to US-65	54.2	40.7	86.9	63.2	-13.5	-23.7	\$1,478,372
44-2**	I-44, at MM/B	13.2	13.3	33.8	19.8	0.1	-14.0	-\$10,582
44-3	I-44, at Chestnut Expwy	0.0	0.0	0.0	0.0	0.0	0.0	\$0
44-4	I-44, West of Route 744 (Kearney)	1.4	1.1	2.0	1.5	-0.3	-0.4	\$35,973
44-5	I-44, at Highway 160 (West Bypass)	29.4	20.6	45.8	31.6	-8.9	-14.2	\$967,075
44-6***	I-44, at US-65	2.8	3.0	4.7	5.0	0.2	0.2	-\$24,944
44-7	I-44, at Mulroy	9.2	9.0	34.3	21.4	-0.2	-12.9	\$21,230
44-8	I-44, at Route 125	6.3	5.7	222.7	16.8	-0.6	-205.9	\$69,972

* Projects 60W-3 and 60W-4 were not carried forward after refined operational analysis did not indicate a need.

**Project 44-2 includes roundabouts at both terminals. Although the project would reduce delays and improve the LOS at the westbound ramp intersection to acceptable levels, it would increase average delays at the eastbound ramps – although not in a meaningful way, as those ramps would still function at LOS B or better. These offsetting improvements result in a slightly negative calculated operational benefit, which is more than offset by the large safety benefit the roundabouts would provide.

***Project 44-6 was recommended from a safety point and an AASHTO design standpoint; operational issues are not apparent today. The proposed improvement combines off-ramp traffic from two ramps to one (and similarly on-ramp traffic), concentrating volumes and slightly increasing average delays (although remaining at very good levels of service).

Safety Benefits

Safety benefits were based on each highway improvement's anticipated reduction in crashes. A simplified crash-reduction forecasting process was used for this prioritization study. For each of the improvements recommended, HDR examined relevant Crash Modification Factors from the *Highway Safety Manual* and FHWA's *Crash Modification Factor (CMF) Clearinghouse*. The CMFs used are listed in Appendix H. Those factors were then used to develop an expected crash-reduction percentage. In some cases, improvements were only expected to address certain crash types, and this was taken into account when developing the percentage. This percentage was applied to the historical annual crash experience at each location to arrive at an expected annual crash reduction. This crash reduction was then extrapolated to the entire multi-year analysis period similar to the delay reduction.

HDR applied the crash costs shown in **Table 14** to the crash reductions to estimate the expected safety benefits of the proposed projects. The distribution of crash severity at a given location was assumed to remain constant over time.

For a graphical representation, the calculation of the safety benefits would be similar to the second row of graphs in **Figure 22**, replacing the product $\Delta VHT \times VTTS$ with the number of crashes reduced $\times$ the average crash cost. The "No-Build" annual number of crashes was assumed to grow linearly at the same rate as traffic volumes (i.e., a steady crash rate over time).

Table 15 provides the estimated number of crashes by severity expected to be eliminated per year for each of the studied projects. The total safety benefit for the lifetime of each project is also provided.

Table 14: Comprehensive Crash Cost Assumptions

Severity Level	Comprehensive Crash Cost	
Fatality	\$4,008,900	
Disabling Injury	\$216,000	} Blended cost for Minor Injury = \$62,000
Evident Injury	\$79,000	
Possible Injury	\$44,900	
PDO	\$7,400	

Source: Highway Safety Manual
(Blended cost developed by HDR)

Table 15: Safety Benefits

Project	Segment	Crashes Eliminated per Year					Project Lifetime Safety Benefit, 2018-2040
		PDO	Minor Injury	Disabling Injury	Fatal	Total	
60W-1	US-60, National to US-65	11.5	4.6	0.3	0.0	16.4	\$7,117,924
60W-2	US-60/360, at MM	0.7	0.3	0.0	0.0	1.0	\$406,868
60W-3*	US-60/360, at Route 413 (Sunshine)	2.4	1.8	0.1	0.0	4.3	\$2,690,594
60W-4*	US-60, at Route FF / US 160 (West Bypass)	2.4	0.7	0.1	0.0	2.8	\$1,198,633
60W-5	US-60, at US-65	2.2	1.2	0.0	0.0	3.4	\$1,611,596
60W-6	US-60, at National	1.0	0.6	0.0	0.0	1.5	\$798,917
60E-1	US-60, at Route 125	9.0	1.8	0.1	0.0	10.9	\$3,561,746
60E-2	US-60, Highland Springs to J / NN	7.2	2.7	0.7	0.0	10.6	\$6,269,664
60E-3	US-60, at FR 189	7.2	2.7	0.7	0.0	10.6	\$6,269,664
60E-4	US-60, J / NN to East of FR 213	3.5	0.9	0.9	0.0	5.4	\$4,775,530
60E-5	US-60, East of FR 213 to Rte. 125	1.6	0.7	0.2	0.0	2.5	\$1,803,325
60E-6	US-60, Route 125 to FR 247	0.6	0.2	0.0	0.0	0.8	\$322,188
44-1	I-44, Route 13 (KS Expwy) to US-65	4.3	2.4	0.2	0.0	6.9	\$6,564,257
44-2	I-44, at MM/B	3.4	0.8	0.1	0.0	4.4	\$3,226,480
44-3	I-44, at Chestnut Expwy	0.3	0.0	0.0	0.0	0.4	\$84,400
44-4	I-44, West of Route 744 (Kearney)	0.1	0.0	0.0	0.0	0.1	\$10,830
44-5	I-44, at Highway 160 (West Bypass)	2.0	0.8	0.1	0.0	3.0	\$1,656,411
44-6	I-44, at US-65	2.1	0.5	0.0	0.0	2.5	\$712,917
44-7	I-44, at Mulroy	0.9	0.4	0.1	0.0	1.4	\$1,921,079
44-8	I-44, at Route 125	1.3	0.1	0.0	0.1	1.5	\$6,434,223

* Projects 60W-3 and 60W-4 were not carried forward after refined operational analysis did not indicate a need.

Other Benefits

Although delay and safety benefits were the main components of the benefit side of the B/C equation, the prioritization methodology allowed for a category of “other” benefits to be factored in. Only one project was assigned such a benefit – the US 60 East Corridor between Harmony Avenue and Farm Road 219. The benefit was computed to account for the travel time savings that could be expected due to the roadway improvement’s expected ability to eliminate the flooding issues along this segment. Based on information from MoDOT staff, this study assumes a flooding event approximately once every five years for a duration of four weeks. During these flooding events, all westbound traffic must be detoured to the eastbound lanes, with one lane operating in each direction in a head-to-head configuration. The crossover to the eastbound lanes occurs at Farm Road 219, and the crossover back to the westbound lanes occurs at Harmony Avenue, which represents a 6,300-foot detour. For the purposes of the benefit calculation, it was assumed that during this detour, peak hour speeds would be reduced from 60 mph to 30 mph and non-peak hour speeds would be reduced to 45 mph. This reduction in travel time was assigned to the hourly traffic volumes for peak and non-peak hours to determine a total event delay. This event delay was normalized to the service life of the mainline lane reconstruction project.

Benefit / Cost (B/C) Ratio vs. Net Benefit

Ranking projects purely by their benefit-to-cost (B/C) ratio may inadvertently push lower-cost projects to the top of the list, given that it is easier for their benefits to far outweigh their costs than it is with very large, expensive projects. An alternative ranking method involves computing the net benefit of each project (sum of benefits minus the cost, instead of benefits divided by cost). **Table 16** shows a prioritized listing of each project using the B/C methodology and **Table 17** shows the prioritized listing using the net benefit methodology, for comparison. **Figure 23** shows each project on a map with rankings from both prioritization methods provided.

If large projects (>\$9M) and small projects are considered in two different groups, the rankings of the two methods are fairly similar.

As stated in the Executive Summary, the top four large (>\$9M) projects are the same “bundle” in both lists, and really represent two projects: (1) US-60 / Route 125 grade separation, Project 60E-1, and (2) a braided ramp improvement on US-60 in the area from Glenstone Avenue to US-65, Project 60W-1. Projects 60E-5 and 60E-6, the remaining two projects, both obtain nearly all their traffic delay benefits from the US-60 / Route 125 grade separation, and thus should ultimately be prioritized much lower on the list.

The fifth large project, Project 60E-2, is conversion of US-60 to a freeway from Highland Springs Road to Route J / NN. Its B/C ratio is below 1.0, but from a planning perspective, it is a reasonable project and a reasonable step toward furthering a grade-separated facility on US-60 heading east from US-65.

For smaller projects, the prioritization is very similar using the two methods as well, with five projects falling at or above a B/C ratio of 0.9.

Table 16: Prioritized Projects – Benefit/Cost Methodology

Rank	ID	Segment	Description	Delay Benefits	Safety Benefits	Other Benefits	Total Benefits	Construction Cost	B/C Ratio
1	44-8	I-44, at Route 125	Signalize WB ramp, accel/decel improvements, close weigh station	\$69,972	\$6,434,223	\$0	\$6,504,194	\$1,049,000	6.2
2	44-5	I-44, at Highway 160 (West Bypass)	2nd LT lane WB off-ramp, accel/decel improvements	\$967,075	\$1,656,411	\$0	\$2,623,485	\$588,000	4.5
3	60W-6	US-60, at National	Add turn lanes; improve ramps	\$3,337,919	\$798,917	\$0	\$4,136,836	\$1,088,000	3.8
*	4	60E-6 US-60, Route 125 to FR 247	close at grades; add outer roads	\$21,037,503	\$349,894	\$0	\$21,387,396	\$9,238,000	2.3
*	5	60E-5 US-60, East of FR 243 to Rte. 125	close at grades; add outer roads	\$21,263,834	\$1,803,325	\$0	\$23,067,159	\$10,194,000	2.3
6	60W-5	US-60, at US-65	Accel/Decel improvements	\$19,872	\$1,611,596	\$0	\$1,631,469	\$750,000	2.2
7	60E-1	US-60, at Route 125	Convert to Interchange	\$21,243,570	\$3,561,746	\$0	\$24,805,317	\$11,883,000	2.1
8	60W-1	US-60, National to US-65	EB Braided Ramp + Interchange improvements	\$14,919,410	\$7,117,924	\$0	\$22,037,334	\$14,591,000	1.5
9	44-2	I-44, at MM/B	Roundabouts at both terminals, accel/decel improvements	-\$10,582	\$3,226,480	\$0	\$3,215,898	\$3,697,000	0.9
10	60E-2	US-60, Highland Springs to J / NN	close at grades + add outer roads	\$1,843,421	\$6,269,664	\$0	\$8,113,085	\$10,558,000	0.8
** ↓	11	44-7 I-44, at Mulroy	Roundabouts at both terminals, accel/decel improvements	\$21,230	\$1,921,079	\$0	\$1,942,310	\$2,895,000	0.7
12	60E-4	US-60, J / NN to East of FR 213	close at grades; add outer roads + signalize WB ramps at J / NN	\$114,927	\$4,775,530	\$401,750	\$5,292,207	\$12,697,000	0.4
13	60E-3	US-60, at FR 189	Convert to Interchange + add outer roads	\$1,843,421	\$6,269,664	\$0	\$8,113,085	\$20,558,000	0.4
14	44-1	I-44, Route 13 (KS Expwy) to US-65	Aux lanes + Interchange Improvements	\$1,478,372	\$6,564,257	\$0	\$8,042,628	\$25,758,000	0.3
15	44-3	I-44, at Chestnut Expwy	Extend and provide positive separation for WB accel	\$0	\$84,400	\$0	\$84,400	\$356,000	0.2
16	44-6	I-44, at US-65	SB-to-EB flyover	-\$24,944	\$712,917	\$0	\$687,973	\$13,102,000	0.1
17	44-4	I-44, West of Route 744 (Kearney)	Extend and provide positive separation for WB accel	\$35,973	\$10,830	\$0	\$46,803	\$919,000	0.1
18	60W-2	US-60/360, at MM	Signals and LT lanes at both ramps	-\$504,240	\$406,868	\$0	-\$97,373	\$814,000	-0.1

Red text indicates projects with a construction cost of greater than \$9M.

* Projects 60E-5 and 60E-6 obtain nearly all their traffic delay benefits from project 60E-1, and so are not considered high priority.

** Projects below a B/C ratio of 0.8 should not be considered a high priority within the horizon year (2040).

Table 17: Prioritized Projects – Net Benefit Methodology

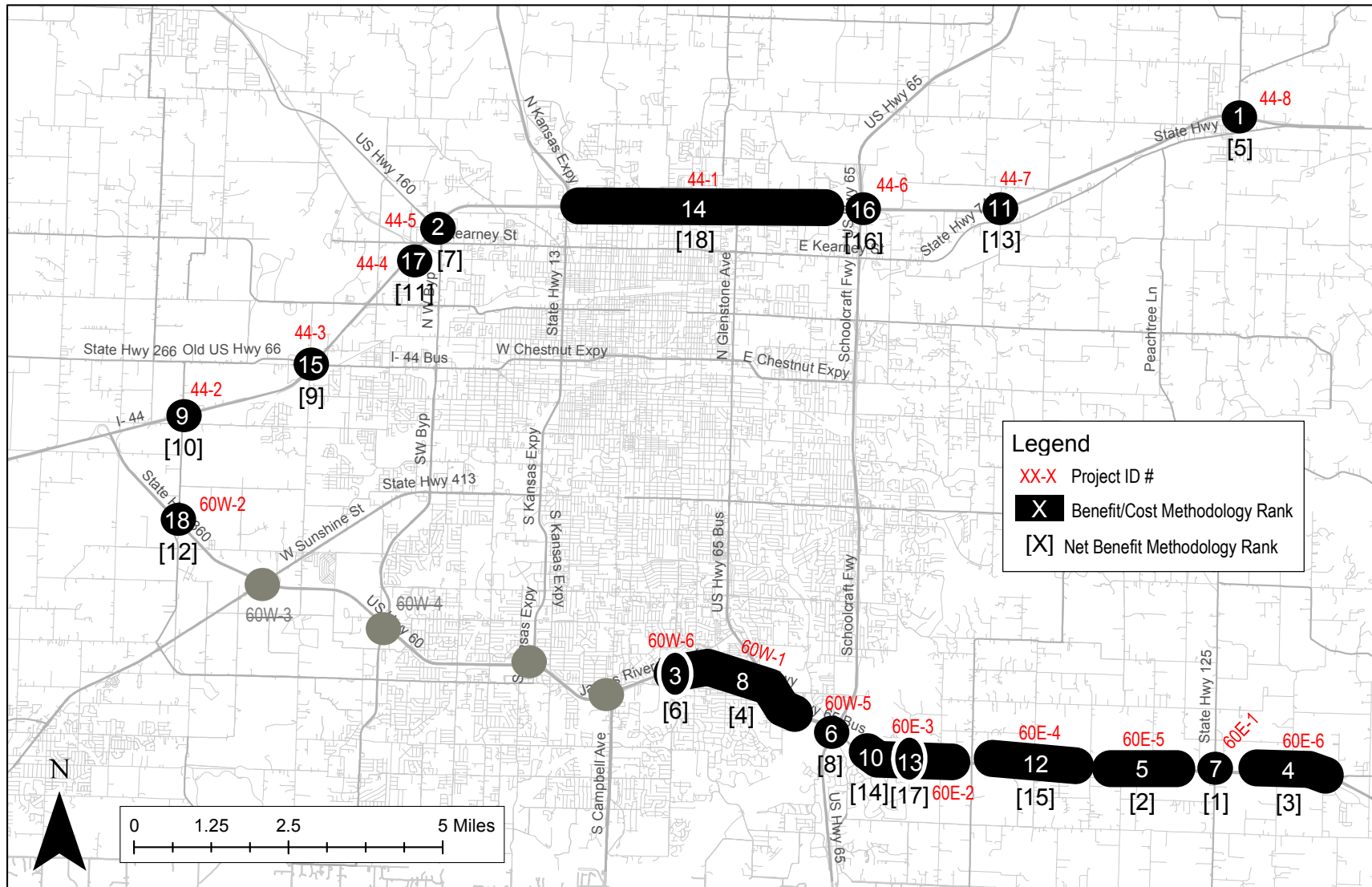
Rank	ID	Segment	Description	Delay Benefits	Safety Benefits	Other Benefits	Total Benefits	Construction Cost	Net Benefit	
1	60E-1	US-60, at Route 125	Convert to Interchange	\$21,243,570	\$3,561,746	\$0	\$24,805,317	\$11,883,000	\$12,922,317	
*	2	60E-5	US-60, East of FR 213 to Rte. 125	close at grades; add outer roads	\$21,252,834	\$1,803,325	\$0	\$23,057,159	\$10,194,000	\$12,863,159
*	3	60E-6	US-60, Route 125 to FR 247	close at grades; add outer roads	\$21,037,503	\$310,894	\$0	\$21,357,396	\$9,238,000	\$12,119,396
4	60W-1	US-60, National to US-65	EB Braided Ramp + Interchange improvements	\$14,919,410	\$7,117,924	\$0	\$22,037,334	\$14,591,000	\$7,446,334	
5	44-8	I-44, at Route 125	Signalize WB ramp, accel/decel improvements, close weigh station	\$69,972	\$6,434,223	\$0	\$6,504,194	\$1,049,000	\$5,455,194	
6	60W-6	US-60, at National	Add turn lanes; improve ramps	\$3,337,919	\$798,917	\$0	\$4,136,836	\$1,088,000	\$3,048,836	
7	44-5	I-44, at Highway 160 (West Bypass)	2nd LT lane WB off-ramp, accel/decl improvements	\$967,075	\$1,656,411	\$0	\$2,623,485	\$588,000	\$2,035,485	
8	60W-5	US-60, at US-65	Accel/Decel improvements	\$19,872	\$1,611,596	\$0	\$1,631,469	\$750,000	\$881,468	
**	9	44-3	I-44, at Chestnut Expwy	Extend and provide positive separation for WB accel	\$0	\$84,400	\$0	\$84,400	\$356,000	-\$271,600
10	44-2	I-44, at MM/B	Roundabouts at both terminals, accel/decel improvements	-\$10,582	\$3,226,480	\$0	\$3,215,898	\$3,697,000	-\$481,102	
11	44-4	I-44, West of Route 744 (Kearney)	Extend and provide positive separation for WB accel	\$35,973	\$10,830	\$0	\$46,803	\$919,000	-\$872,197	
12	60W-2	US-60/360, at MM	Signals and LT lanes at both ramps	-\$504,240	\$406,868	\$0	-\$97,373	\$814,000	-\$911,373	
13	44-7	I-44, at Mulroy	Roundabouts at both terminals, accel/decel improvements	\$21,230	\$1,921,079	\$0	\$1,942,310	\$2,895,000	-\$952,690	
14	60E-2	US-60, Highland Springs to J / NN	close at-grades + add outer roads	\$1,843,421	\$6,269,664	\$0	\$8,113,085	\$10,558,000	-\$2,444,915	
15	60E-4	US-60, J / NN to East of FR 213	close at-grades; add outer roads + signalize WB ramps at J / NN	\$114,927	\$4,775,530	\$401,750	\$5,292,207	\$12,697,000	-\$7,404,793	
16	44-6	I-44, at US-65	SB-to-EB flyover	-\$24,944	\$712,917	\$0	\$687,973	\$13,102,000	-\$12,414,028	
17	60E-3	US-60, at FR 189	Convert to Interchange + add outer roads	\$1,843,421	\$6,269,664	\$0	\$8,113,085	\$20,558,000	-\$12,444,915	
18	44-1	I-44, Route 13 (KS Expwy) to US-65	Aux lanes + Interchange Improvements	\$1,478,372	\$6,564,257	\$0	\$8,042,628	\$25,758,000	-\$17,715,372	

Red text indicates projects with a construction cost of greater than \$9M.

* Projects 60E-5 and 60E-6 obtain nearly all their traffic delay benefits from project 60E-1, and so are not considered high priority.

** Projects with negative benefits should typically not be considered a high priority within the horizon year (2040); however, projects within a reasonable B/C ratio, as shown in Table 16, could be considered.

Figure 23: Prioritized Projects

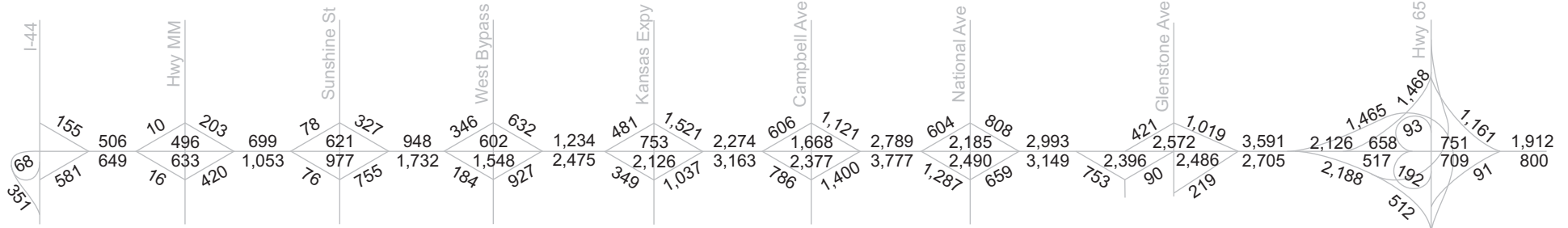


Appendix A
No-Build Mainline and Ramp Volume Diagrams
(2017 and 2040)

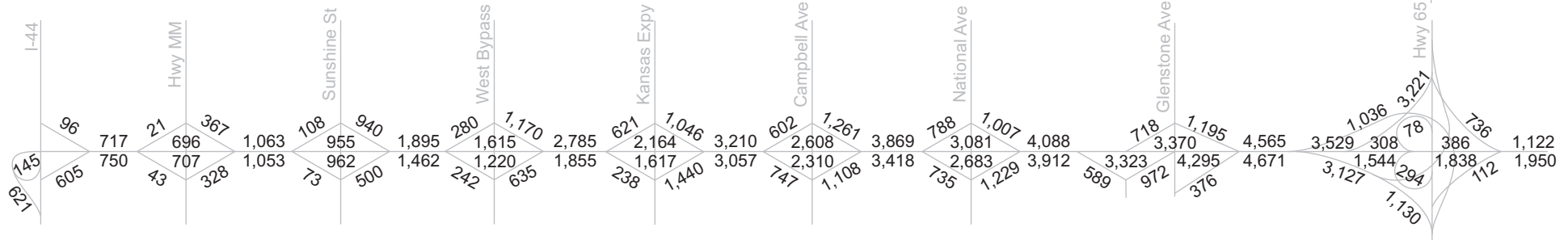
US 60 West Corridor - Peak Hour Mainline and Ramp Volumes

2017

AM

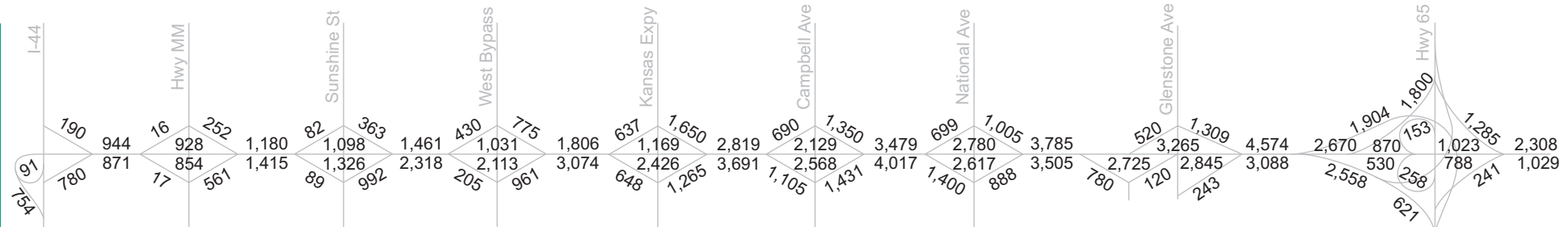


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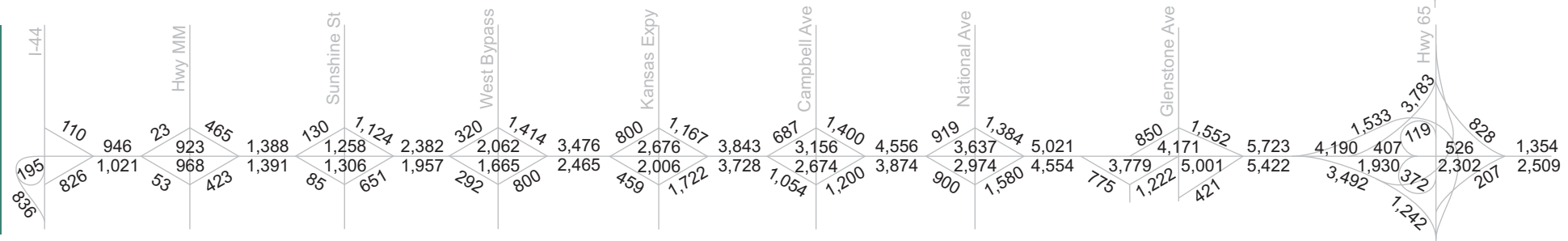


2040

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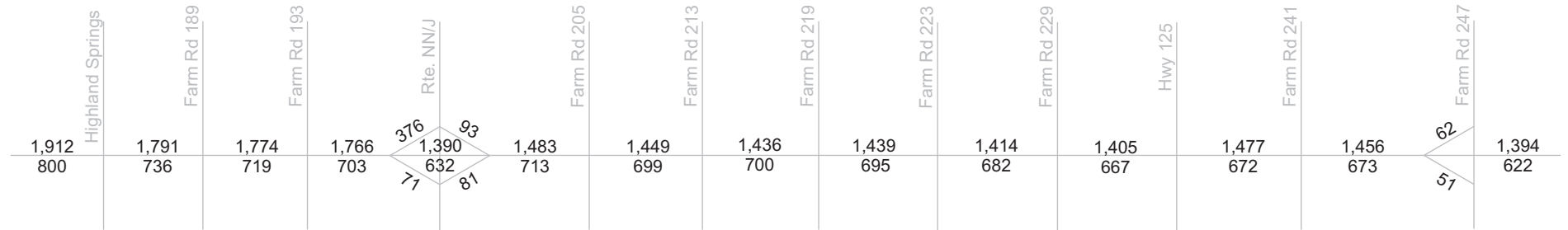
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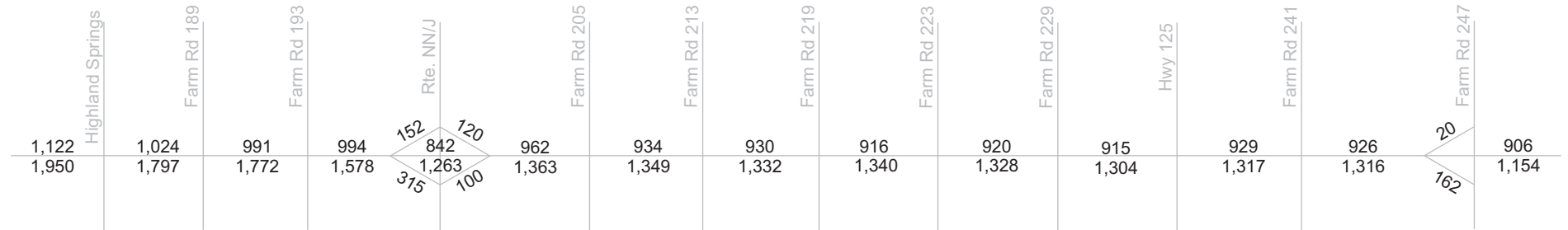
US 60 East Corridor - Peak Hour Mainline and Ramp Volumes

2017

AM

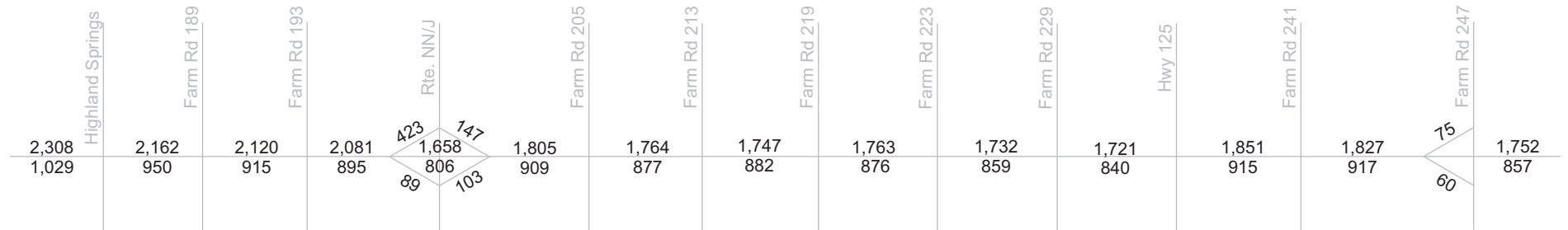


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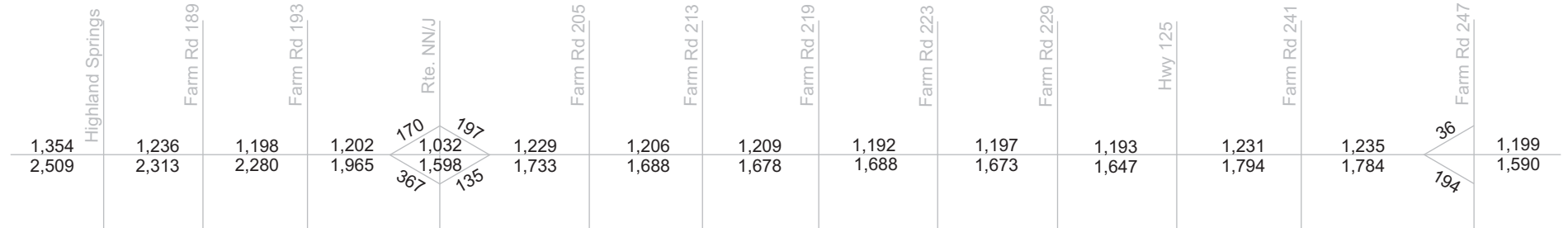


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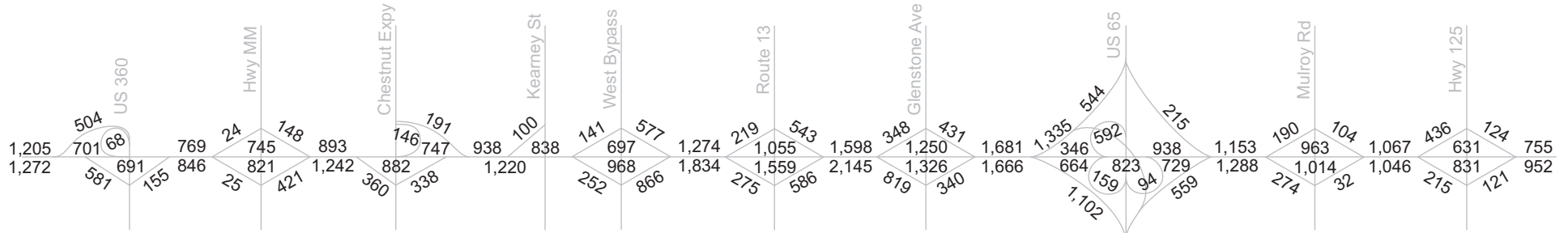
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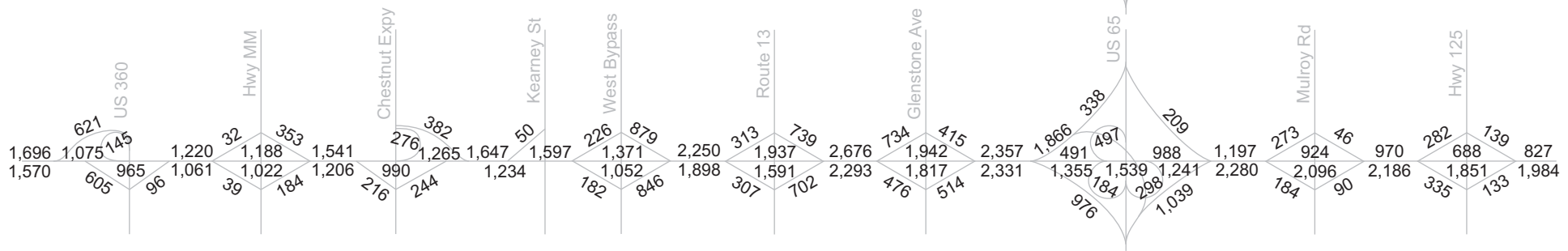
I-44 Corridor - Peak Hour Mainline and Ramp Volumes

2017

AM

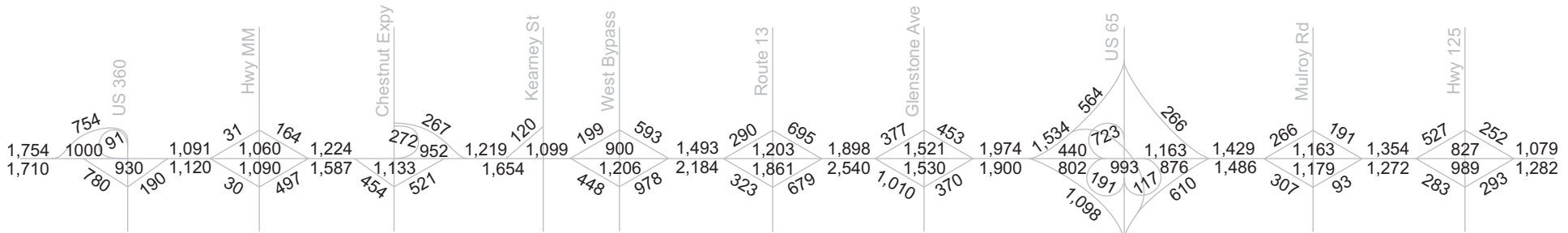


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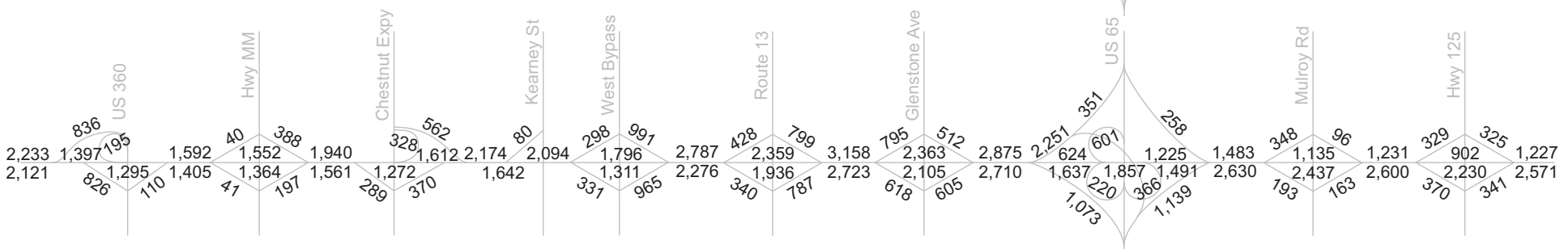


2040

AM



PM



Appendix B
2017 No-Build Operational Analysis

2017 No-Build Mainline Analysis Tables

US 60 West Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
US-60 Before I-44 EB On-Ramp	Basic	2,176	A	1.1	0.03	A	2.3	0.07
I-44 EB On-Ramp	Merge	2,311	A	2.2	0.31	A	3.6	0.35
Between I-44 EB On-Ramp and Hwy MM Off-Ramp	Basic	4,622	A	5.3	0.15	A	6.0	0.18
Hwy MM Off-Ramp	Diverge	4,622	A	4.5	0.15	A	5.4	0.18
Between Hwy MM Off-Ramp and On-Ramp	Basic	4,633	A	5.1	0.15	A	5.6	0.16
Hwy MM On-Ramp	Merge	4,654	A	9.9	0.25	A	9.8	0.24
Between Hwy MM On-Ramp and MO-413 Off-Ramp	Basic	4,654	A	8.4	0.25	A	8.2	0.24
MO-413 Off-Ramp	Diverge	4,654	A	7.8	0.25	A	7.5	0.24
Between MO-413 Off-Ramp and On-Ramp	Basic	4,648	A	7.8	0.23	A	7.6	0.22
MO-413 On-Ramp	Merge	4,681	B	16.1	0.40	B	13.7	0.33
Between MO-413 On-Ramp and US-160 Off-Ramp	Basic	4,681	B	13.8	0.40	B	11.4	0.33
US-160 Off-Ramp	Diverge	4,681	B	15.1	0.40	B	12.3	0.33
Between US-160 Off-Ramp and On-Ramp	Basic	4,673	B	12.4	0.36	A	9.6	0.28
US-160 On-Ramp	Merge	4,702	C	22.7	0.57	B	17.2	0.42
Between US-160 On-Ramp and MO-13 Off-Ramp	Basic	4,702	C	19.7	0.57	B	14.4	0.42
MO-13 Off-Ramp	Diverge	4,702	C	21.5	0.57	B	15.2	0.42
Between MO-13 Off-Ramp and On-Ramp	Basic	4,694	B	16.9	0.49	B	12.5	0.37
MO-13 On-Ramp	Merge	4,687	C	23.0	0.73	C	21.2	0.69
Between MO-13 On-Ramp and S Campbell Off-Ramp	Basic	7,031	B	16.8	0.49	B	15.7	0.46
S Campbell Off-Ramp	Diverge	4,687	C	21.0	0.73	B	19.1	0.69
Between S Campbell Off-Ramp and On-Ramp	Basic	4,681	C	19.0	0.55	B	17.9	0.52
Between S Campbell On-Ramp and S National Off-Ramp	Weave	5,232	C	27.8	0.79	C	22.8	0.63
Between S National Off-Ramp and S National On-Ramp	Basic	4,627	C	20.2	0.59	F	51.0	0.61
S National On-Ramp	Merge	4,629	C	23.5	0.74	E	71.3	0.88
Between S National On-Ramp and Republic Off-Ramp	Basic	6,944	B	16.9	0.49	F	119.1	0.59
Republic Off-Ramp	Diverge	4,629	C	21.3	0.74	E	84.4	0.88
Between Republic Off-Ramp and BUS-65 On-Ramp	Basic	4,593	C	19.6	0.57	F	101.2	0.75
BUS-65 On-Ramp	Merge	4,597	C	21.8	0.59	E	68.8	0.96
Republic On-Ramp	Merge	4,598	B	19.9	0.64	D	32.9	1.05
Between Republic On-Ramp and US-65 Off-Ramp	Basic	6,897	B	14.6	0.43	C	23.2	0.70
US-65 Off-Ramp	Diverge	4,598	B	17.2	0.64	D	31.6	1.05
Between US-65 Off-Ramp and US-65 SB On-Ramp	Basic	4,758	A	4.1	0.12	B	11.2	0.35
US-65 SB On-Ramp	Merge	4,490	A	8.3	0.17	B	16.7	0.42
US-65 NB On-Ramp	Merge	4,460	A	5.6	0.20	B	13.8	0.44
After US-65 NB On-Ramp	Basic	4,460	A	6.7	0.20	B	14.2	0.44

2017 No-Build Mainline Analysis Tables cont.

US 60 West Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
US-60 Before US-65 NB Off-Ramp	Basic	4,607	B	15.5	0.45	A	9.1	0.27
US-65 NB Off-Ramp	Diverge	4,607	B	13.4	0.45	A	5.7	0.27
US-65 SB Off-Ramp	Diverge	4,627	B	18.4	0.18	B	10.8	0.09
Between US-65 SB Off-Ramp and US-65 SB On-Ramp	Basic	4,658	A	5.3	0.15	A	2.4	0.07
US-65 SB On-Ramp	Merge	7,017	B	11.3	0.33	B	11.6	0.53
US-65 NB On-Ramp	Merge	7,043	C	21.2	0.55	B	18.5	0.68
Between US-65 NB On-Ramp and S Glenstone Off-Ramp	Basic	7,043	C	19.1	0.55	B	16.9	0.68
S Glenstone Off-Ramp	Diverge	7,043	B	19.1	0.55	B	16.9	0.68
Between S Glenstone Off-Ramp and On-Ramp	Basic	4,680	C	20.7	0.60	C	18.6	0.75
S Glenstone On-Ramp	Merge	4,686	C	21.9	0.69	C	22.0	0.91
Between S Glenstone On-Ramp and S National Off-Ramp	Basic	7,028	B	15.9	0.46	B	16.1	0.61
S National Off-Ramp	Diverge	4,686	B	19.4	0.69	B	19.8	0.91
Between S National Off-Ramp and On-Ramp	Basic	4,670	B	17.4	0.51	C	18.2	0.69
Between National On-Ramp and S Campbell Off-Ramp	Weave	5,555	B	18.8	0.55	C	21.7	0.70
Between S Campbell Off-Ramp and On-Ramp	Basic	4,656	B	13.2	0.38	B	16.3	0.58
S Campbell On-Ramp	Merge	4,675	B	15.4	0.52	B	18.6	0.72
Between S Campbell On-Ramp and MO-13 Off-Ramp	Basic	7,013	B	12.0	0.35	B	14.0	0.48
MO-13 Off-Ramp	Diverge	4,675	B	12.4	0.52	B	16.0	0.72
Between MO-13 Off-Ramp and On-Ramp	Basic	4,571	A	6.0	0.17	B	14.2	0.49
MO-13 On-Ramp	Merge	4,631	B	11.6	0.29	C	21.6	0.63
Between MO-13 On-Ramp and US-160 Off-Ramp	Basic	4,631	A	9.8	0.29	C	19.0	0.63
US-160 Off-Ramp	Diverge	4,631	B	10.1	0.29	C	21.2	0.63
Between US-160 Off-Ramp and US-160 On-Ramp	Basic	4,506	A	4.8	0.14	B	11.1	0.37
US-160 On-Ramp	Merge	4,599	A	9.7	0.22	B	15.9	0.43
Between US-160 On-Ramp and MO-413 Off-Ramp	Basic	4,599	A	7.5	0.22	B	13.3	0.43
MO-413 Off-Ramp	Diverge	4,599	A	3.0	0.22	A	9.9	0.43
Between MO-413 Off-Ramp and On-Ramp	Basic	4,513	A	5.0	0.15	A	6.8	0.22
MO-413 On-Ramp	Merge	4,544	A	6.5	0.16	A	8.8	0.24
Between MO-413 On-Ramp and Hwy MM Off-Ramp	Basic	4,544	A	5.6	0.16	A	7.6	0.24
Hwy MM Off-Ramp	Diverge	4,544	A	4.5	0.16	A	6.9	0.24
Between Hwy MM Off-Ramp and On-Ramp	Basic	4,521	A	4.0	0.12	A	5.0	0.16
Hwy MM On-Ramp	Merge	4,490	A	5.0	0.12	A	6.3	0.17
Between Hwy MM On-Ramp and I-44 EB Off-Ramp	Basic	4,490	A	4.1	0.12	A	5.2	0.17
I-44 EB Off-Ramp	Diverge	4,490	A	4.1	0.12	A	5.2	0.17
US 60 After I-44 EB Off-Ramp	Basic	2,273	A	5.6	0.16	A	9.0	0.29

2017 No-Build Mainline Analysis Tables cont.

US 60 East Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
US-60 Before Rte NN Off-Ramp	Basic	4,364	A	5.5	0.17	B	11.9	0.36
Rte NN Off-Ramp	Diverge	4,364	A	4.9	0.17	B	12.6	0.36
Between Rte NN Off-Ramp and On-Ramp	Basic	4,355	A	4.9	0.15	A	9.5	0.29
Rte NN On-Ramp	Merge	4,365	A	5.7	0.17	B	10.9	0.31
Between Rte NN On-Ramp and Farm Road 247 Off-Ramp	Basic	4,360	A	5.2	0.16	A	9.9	0.30
Farm Road 247 Off-Ramp	Diverge	4,360	B	10.3	0.16	B	16.0	0.30
US-60 After Farm Road 247 Off-Ramp	Basic	4,354	A	4.8	0.15	A	8.7	0.26

US 60 East Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
US-60 Before Farm Road 247 On-Ramp	Basic	4,364	A	10.8	0.33	A	6.8	0.21
Farm Road 247 On-Ramp	Merge	4,367	B	12.5	0.35	A	7.8	0.21
Between Farm Road 247 On-Ramp and Rte NN Off-Ramp	Basic	4,367	B	11.3	0.35	A	7.0	0.21
Rte NN Off-Ramp	Diverge	4,368	B	12.4	0.35	A	7.3	0.22
Between Rte NN Off-Ramp and On-Ramp	Basic	4,363	A	10.8	0.33	A	6.3	0.19
Rte NN On-Ramp	Merge	4,380	B	13.4	0.42	A	6.7	0.23
US-60 After Rte NN On-Ramp	Basic	4,380	B	13.7	0.42	A	7.5	0.23

2017 No-Build Mainline Analysis Tables cont.

I-44 Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
I-44 Before US-360 SB Off-Ramp	Basic	3,780	B	12.6	0.37	B	15.0	0.44
US-360 SB Off-Ramp	Diverge	3,780	A	8.7	0.37	B	11.7	0.44
Between US-360 SB Off-Ramp and NB On-Ramp	Basic	3,298	A	7.8	0.23	A	10.3	0.30
US-360 NB On-Ramp	Merge	3,476	A	9.3	0.26	B	11.3	0.32
Between US-360 NB On-Ramp and Hwy MM Off-Ramp	Basic	3,476	A	9.1	0.26	B	11.0	0.32
Hwy MM Off-Ramp	Diverge	3,476	B	12.6	0.26	B	14.9	0.32
Between Hwy MM Off-Ramp and Hwy MM On-Ramp	Basic	3,450	A	8.9	0.26	A	10.7	0.31
Hwy MM On-Ramp	Merge	3,764	B	15.5	0.36	B	15.1	0.35
Between Hwy MM On-Ramp and MO-266 Off-Ramp	Basic	3,764	B	12.3	0.36	B	12.1	0.35
MO-266 Off-Ramp	Diverge	3,764	B	14.0	0.36	B	13.8	0.35
Between MO-266 Off-Ramp and On-Ramp	Basic	3,511	A	9.4	0.27	A	10.4	0.30
MO-266 On-Ramp	Merge	3,751	B	14.7	0.35	B	14.9	0.36
Between MO-266 On-Ramp and West Bypass Off-Ramp	Basic	3,381	B	13.5	0.39	B	13.9	0.40
West Bypass Off-Ramp	Diverge	3,381	B	14.9	0.39	B	15.4	0.40
Between West Bypass Off-Ramp and On-Ramp	Basic	3,583	A	10.1	0.29	A	10.9	0.32
West Bypass On-Ramp	Merge	3,991	C	20.4	0.50	C	21.1	0.51
Between West Bypass On-Ramp and MO-13 Off-Ramp	Basic	3,991	B	17.1	0.50	B	17.6	0.51
MO-13 Off-Ramp	Diverge	3,991	C	21.2	0.50	C	21.8	0.51
Between MO-13 Off-Ramp and On-Ramp	Basic	3,903	B	14.9	0.43	B	15.2	0.44
MO-13 On-Ramp	Merge	4,067	C	22.9	0.57	C	24.3	0.61
Between MO-13 On-Ramp and Glenstone Off-Ramp	Basic	4,067	C	19.8	0.57	C	21.0	0.61
Glenstone Off-Ramp	Diverge	4,067	C	22.0	0.57	C	23.3	0.61
Between Glenstone Off-Ramp and On-Ramp	Basic	3,807	B	13.0	0.38	B	17.0	0.50
Glenstone On-Ramp	Merge	3,941	B	19.6	0.46	C	25.5	0.61
Between Glenstone On-Ramp and US-65 SB Off-Ramp	Basic	3,941	B	15.8	0.46	C	21.3	0.61
US-65 SB Off-Ramp	Diverge	3,941	B	18.0	0.46	C	24.3	0.61
Between US-65 SB Off-Ramp and SB On-Ramp	Basic	3,264	A	7.6	0.22	B	13.3	0.39
US-65 SB On-Ramp and NB Off-Ramp	Weave	4,333	A	6.5	0.21	B	11.4	0.34
Between US-65 NB Off-Ramp and NB On-Ramp	Basic	3,346	A	8.1	0.24	B	12.4	0.36
US-65 NB On-Ramp	Merge	3,788	B	15.2	0.37	C	23.9	0.60
Between US-65 NB On-Ramp and Farm Road 199 Off-Ramp	Basic	3,788	B	12.7	0.37	C	20.8	0.60
Farm Road 199 Off-Ramp	Diverge	3,788	B	13.2	0.37	C	22.8	0.60
Between Farm Road 199 Off-Ramp and On-Ramp	Basic	3,619	A	10.5	0.30	C	19.3	0.56
Farm Road 199 On-Ramp	Merge	3,643	B	12.8	0.31	C	22.9	0.58
Between Farm Road 199 On-Ramp and MO-125 Off-Ramp	Basic	3,643	A	10.7	0.31	C	20.0	0.58
MO-125 Off-Ramp	Diverge	3,643	B	10.8	0.31	C	21.8	0.58
Between MO-125 Off-Ramp and On-Ramp	Basic	3,463	A	9.0	0.26	B	17.2	0.50
MO-125 On-Ramp	Merge	3,570	B	12.0	0.29	C	21.0	0.53
I-44 After MO-125 On-Ramp	Basic	3,570	A	9.9	0.29	C	18.3	0.53

2017 No-Build Mainline Analysis Tables cont.

I-44 Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	V/C	LOS	Density (veh/mi/ln)	V/C
I-44 Before MO-125 Off-Ramp	Basic	3,780	A	7.4	0.22	A	7.9	0.23
MO-125 Off-Ramp	Diverge	3,780	A	-0.3	0.22	A	0.3	0.23
Between MO-125 Off-Ramp and On-Ramp	Basic	3,658	A	6.4	0.19	A	6.8	0.20
MO-125 On-Ramp	Merge	3,982	B	11.8	0.29	B	10.7	0.26
Between MO-125 On-Ramp and Farm Road 199 Off-Ramp	Basic	3,982	A	10.0	0.29	A	9.1	0.26
Farm Road 199 Off-Ramp	Diverge	3,982	B	11.1	0.29	A	9.9	0.26
Between Farm Road 199 Off-Ramp and On-Ramp	Basic	3,927	A	9.1	0.27	A	8.7	0.25
Farm Road 199 On-Ramp	Merge	4,020	B	13.0	0.31	B	13.2	0.32
Between Farm Road 199 On-Ramp and US-65 NB Off-Ramp	Basic	4,020	A	10.7	0.31	A	10.9	0.32
US-65 NB Off-Ramp	Diverge	4,020	A	9.9	0.31	B	10.0	0.32
US-65 SB Off-Ramp	Diverge	3,913	B	12.6	0.26	B	12.8	0.27
Between US-65 SB Off-Ramp and US-65 On-Ramp	Basic	3,143	A	4.1	0.12	A	5.2	0.15
US-65 On-Ramp	Merge	4,179	B	12.8	0.44	B	18.1	0.58
Between US-65 On-Ramp and Glenstone Off-Ramp	Basic	4,179	B	15.0	0.44	C	20.2	0.58
Glenstone Off-Ramp	Diverge	4,179	C	20.8	0.44	C	26.8	0.58
Between Glenstone Off-Ramp and On-Ramp	Basic	4,059	B	11.5	0.34	B	16.7	0.49
Glenstone On-Ramp	Merge	4,161	B	17.5	0.42	C	26.4	0.66
Between Glenstone On-Ramp and MO-13 Off-Ramp	Basic	4,161	B	14.3	0.42	C	23.1	0.66
MO-13 Off-Ramp	Diverge	4,161	B	15.3	0.42	C	25.1	0.66
Between MO-13 Off-Ramp and On-Ramp	Basic	3,976	A	9.9	0.29	B	16.7	0.49
MO-13 On-Ramp	Merge	4,067	B	15.2	0.34	C	23.2	0.56
Between MO-13 On-Ramp and West Bypass Off-Ramp	Basic	4,067	B	11.7	0.34	C	19.2	0.56
West Bypass Off-Ramp	Diverge	4,067	B	13.4	0.34	C	22.4	0.56
Between West Bypass Off-Ramp and On-Ramp	Basic	3,729	A	7.0	0.20	B	12.2	0.36
West Bypass On-Ramp	Merge	3,499	B	10.9	0.26	B	17.2	0.44
Between West Bypass On-Ramp and Kearney On-Ramp	Basic	3,499	A	8.9	0.26	B	15.0	0.44
Kearney On-Ramp	Merge	3,913	B	12.4	0.26	B	18.5	0.42
Between Kearney On-Ramp and MO-266 Off-Ramp	Basic	3,913	A	8.9	0.26	B	14.4	0.42
MO-266 Off-Ramp	Diverge	3,913	B	10.2	0.26	B	16.8	0.42
Between MO-266 Off-Ramp and On-Ramp	Basic	3,772	A	7.4	0.22	B	11.4	0.33
MO-266 On-Ramp	Merge	3,884	A	5.6	0.25	B	11.0	0.40
Between MO-266 On-Ramp and Hwy MM Off-Ramp	Basic	3,884	A	8.6	0.25	B	13.6	0.40
Hwy MM Off-Ramp	Diverge	3,884	B	11.0	0.25	B	17.0	0.40
Between Hwy MM Off-Ramp and On-Ramp	Basic	3,772	A	7.4	0.22	A	10.8	0.31
Hwy MM On-Ramp	Merge	3,794	A	9.4	0.22	B	13.2	0.32
Between Hwy MM On-Ramp and US-360 SB Off-Ramp	Basic	3,794	A	7.6	0.22	B	11.0	0.32
US-360 SB Off-Ramp	Diverge	3,794	A	6.1	0.22	B	10.2	0.32
Between US-360 SB Off-Ramp and US-360 NB On-Ramp	Basic	3,729	A	7.0	0.20	A	9.9	0.29
US-360 NB On-Ramp	Merge	4,042	B	11.0	0.32	B	14.9	0.43
I-44 After US-360 NB On-Ramp	Merge	4,042	B	11.1	0.32	B	14.8	0.43

2017 No-Build Intersection Analysis Tables

US 60 Corridors

Synchro ID	Intersection	AM		PM	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
US 60 West Corridor					
118*	US 60 WB Ramps & Hwy MM	C	21.5	D	25.3
115*	US 60 EB Ramps & Hwy MM	F	52	E	43
6	US 60 WB Ramps & Sunshine St	B	10.6	C	21.1
12	US 60 EB Ramps & Sunshine St	A	5.3	A	6.2
17	US 60 WB Ramps & West Bypass	B	12.3	C	27.6
20	US 60 EB Ramps & West Bypass	B	15.2	B	10.8
88	US 60 WB Ramps & Kansas Expwy	C	34.5	C	24.5
93	US 60 EB Ramps & Kansas Expwy	C	32	F	109.2
95	US 60 EB Ramps Right & Kansas Expwy	A	4.1	A	5.4
31	Campbell Ave & Republic Rd	E	61.8	E	58.7
28	Campbell Ave & US 60 WB Ramps	B	12.1	C	23.2
24	Campbell Ave & US 60 EB Ramps	B	15.5	B	11.3
36	Campbell Ave & El Camino Alto	C	21.3	C	34
56*	US 60 & National Ave WB On-Ramp	A	0	A	0
64	US 60 & National Ave WB Off-Ramp Left	A	3	B	12.1
66	US 60 & National Ave North DDI Intersection	C	27.2	C	27.2
68	US 60 & National Ave WB Off-Ramp Right	B	14.9	A	7.6
62*	US 60 & National Ave EB On-Ramp	C	15.6	F	197.1
77	US 60 & National Ave EB Off-Ramp Left	B	10.1	A	6.2
79	US 60 & National Ave South DDI Intersection	C	29.2	C	33.3
81	US 60 & National Ave EB Off-Ramp Right	B	16.3	B	10.2
46	US 60 WB Ramps & Glenstone Ave	D	41.5	E	64.7
43	US 60 EB Ramps & Republic Rd/Glenstone	C	33.4	C	27.4
US 60 East Corridor					
5*	US 60 & Highland Springs Blvd (N)	E	38.5	C	15.9
6*	US 60 & Highland Springs Blvd (S)	D	25.8	F	573.3
8*	US 60 & Farm Rd 189 (N)	F	231.5	D	25.6
9*	US 60 & Farm Rd 189 (S)	C	20.2	F	120.2
12*	US 60 & Farm Rd 193 (N)	F	102.1	D	30.6
13*	US 60 & Farm Rd 193 (S)	C	17.2	F	77.3
60*	US 60 WB Ramps & Route NN/J	D	34.1	B	13.4
63*	US 60 EB Ramps & Route NN/J	B	12.6	B	12
16*	US 60 & Farm Rd 205 (N)	D	33.9	C	21.3
17*	US 60 & Farm Rd 205 (S)	C	17.7	E	47
20*	US 60 & Farm Rd 213 (N)	E	38	C	18.1
21*	US 60 & Farm Rd 213 (S)	B	14.6	D	30.9
24*	US 60 & Farm Rd 219 (N)	F	52.1	C	18.2
25*	US 60 & Farm Rd 219 (S)	C	15.2	D	30.9
29*	US 60 & Farm Rd 223 (N)	F	78.4	C	20.8
30*	US 60 & Farm Rd 223 (S)	B	14.8	C	18.9
33*	US 60 & Farm Rd 229 (N)	E	46.8	C	19.2
34*	US 60 & Farm Rd 229 (S)	B	11.5	C	15.9
36	US 60 & Hwy 125 (N)	F	1750.5	F	502
37	US 60 & Hwy 125 (S)	F	113.1	F	207.9
40*	US 60 & Farm Rd 241 (N)	C	19	B	12.5
41*	US 60 & Farm Rd 241 (S)	C	17.2	D	32.7
53*	US 60 EB Off-Ramp & Farm Rd 247	A	7.8	A	8.6

*At unsignalized intersections, LOS and delay for the worst movement is shown.

2017 No-Build Intersection Analysis Tables cont.

I-44 Corridor

Synchro ID	Intersection	AM		PM	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
117*	I-44 WB Ramps & Hwy MM	C	21.4	F	75.4
113*	I-44 EB Ramps & Hwy MM	C	17	C	22.4
101	I-44 WB Ramps & Chestnut Expwy	D	36.8	C	30.1
96	I-44 EB Ramps & Chestnut Expwy	B	18.6	C	22.1
85	I-44 WB Ramps & West Bypass	C	27.1	B	14.8
81	I-44 EB Ramps & West Bypass	B	10.4	A	9.5
54	I-44 & Route 13 EB Off-Ramp Right	A	3.5	A	4.5
62	I-44 & Route 13 South DDI Intersection	B	18.9	D	45.8
65	I-44 & Route 13 WB Off-Ramp Right	A	4.5	A	9.2
66	I-44 & Route 13 North DDI Intersection	B	19.7	C	33.1
67*	I-44 & Route 13 WB Off-Ramp Left	C	22.1	C	15.3
59*	I-44 & Route 13 WB On-Ramp	A	9.4	B	10.1
40	I-44 WB Ramps & Glenstone Ave	C	22.5	D	38.9
36	I-44 EB Ramps & Glenstone Ave	C	33	C	25.8
26*	I-44 WB Ramps & N Mulroy Rd	B	14	C	22.3
17*	I-44 EB Ramps & N Mulroy Rd	B	12	B	11
8*	I-44 WB Ramps & Hwy 125	E	38	C	22.4
7	I-44 EB Ramps & Hwy 125	B	10.7	B	11.3

*At unsignalized intersections, LOS and delay for the worst movement is shown.

Appendix C
2040 No-Build Operational Analysis

2040 No-Build Mainline Analysis Tables

US 60 West Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
US-60 Before I-44 EB On-Ramp	Basic	2,176	A	1.6	0.05	A	3.0	0.09
I-44 EB On-Ramp	Merge	2,311	A	4.3	0.41	A	6.2	0.48
Between I-44 EB On-Ramp and Hwy MM Off-Ramp	Basic	4,622	A	7.0	0.21	A	8.2	0.24
Hwy MM Off-Ramp	Diverge	4,622	A	6.6	0.21	A	8.0	0.24
Between Hwy MM Off-Ramp and On-Ramp	Basic	4,633	A	6.9	0.20	A	7.7	0.23
Hwy MM On-Ramp	Merge	4,654	B	13.1	0.33	B	12.8	0.32
Between Hwy MM On-Ramp and MO-413 Off-Ramp	Basic	4,654	B	11.3	0.33	A	11.0	0.32
MO-413 Off-Ramp	Diverge	4,654	B	11.3	0.33	B	10.9	0.32
Between MO-413 Off-Ramp and On-Ramp	Basic	4,648	A	10.7	0.31	A	10.3	0.30
MO-413 On-Ramp	Merge	4,681	C	21.2	0.54	B	17.9	0.45
Between MO-413 On-Ramp and US-160 Off-Ramp	Basic	4,681	C	18.5	0.54	B	15.3	0.45
US-160 Off-Ramp	Diverge	4,681	C	20.8	0.54	B	16.9	0.45
Between US-160 Off-Ramp and On-Ramp	Basic	4,673	B	16.9	0.49	B	13.1	0.38
US-160 On-Ramp	Merge	4,702	C	27.9	0.71	C	22.3	0.56
Between US-160 On-Ramp and MO-13 Off-Ramp	Basic	4,702	C	25.5	0.71	C	19.2	0.56
MO-13 Off-Ramp	Diverge	4,702	C	27.2	0.71	C	20.9	0.56
Between MO-13 Off-Ramp and On-Ramp	Basic	4,694	C	19.4	0.56	B	18.0	0.46
MO-13 On-Ramp	Merge	4,687	C	27.5	0.86	D	32.8	0.84
Between MO-13 On-Ramp and S Campbell Off-Ramp	Basic	7,031	C	19.7	0.57	F	56.0	0.56
S Campbell Off-Ramp	Diverge	4,687	C	26.2	0.86	E	53.2	0.84
Between S Campbell Off-Ramp and On-Ramp	Basic	4,681	C	20.9	0.60	E	40.5	0.61
Between S Campbell On-Ramp and S National Off-Ramp	Weave	5,232	D	30.2	0.83	F	97.9	0.72
Between S National Off-Ramp and S National On-Ramp	Basic	4,627	C	21.4	0.62	F	119.1	0.67
S National On-Ramp	Merge	4,629	C	26.5	0.83	E	87.4	1.03
Between S National On-Ramp and Republic Off-Ramp	Basic	6,944	C	18.9	0.55	F	124.4	0.68
Republic Off-Ramp	Diverge	4,629	C	24.8	0.83	E	89.5	1.03
Between Republic Off-Ramp and BUS-65 On-Ramp	Basic	4,593	C	22.6	0.65	F	107.6	0.86
BUS-65 On-Ramp	Merge	4,597	C	25.0	0.67	E	70.4	1.12
Republic On-Ramp	Merge	4,598	C	23.4	0.73	D	30.8	1.22
Between Republic On-Ramp and US-65 Off-Ramp	Basic	6,897	B	16.7	0.49	C	21.6	0.81
US-65 Off-Ramp	Diverge	4,598	C	21.0	0.73	D	29.2	1.22
Between US-65 Off-Ramp and US-65 SB On-Ramp	Basic	4,758	A	4.2	0.12	B	11.4	0.43
US-65 SB On-Ramp	Merge	4,490	A	9.0	0.19	B	17.6	0.52
US-65 NB On-Ramp	Merge	4,460	A	7.7	0.26	B	15.6	0.57
After US-65 NB On-Ramp	Basic	4,460	A	8.8	0.26	B	15.9	0.57

2040 No-Build Mainline Analysis Tables cont.

US 60 West Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
US-60 Before US-65 NB Off-Ramp	Basic	4,607	C	18.7	0.55	A	11.0	0.32
US-65 NB Off-Ramp	Diverge	4,607	B	17.2	0.55	A	7.9	0.32
US-65 SB Off-Ramp	Diverge	4,627	C	22.3	0.24	B	13.0	0.12
Between US-65 SB Off-Ramp and US-65 SB On-Ramp	Basic	4,658	A	7.0	0.20	A	3.2	0.09
US-65 SB On-Ramp	Merge	7,017	B	14.2	0.41	B	12.1	0.63
US-65 NB On-Ramp	Merge	7,043	D	28.2	0.71	C	22.3	0.85
Between US-65 NB On-Ramp and S Glenstone Off-Ramp	Basic	7,043	C	25.1	0.71	C	20.0	0.85
S Glenstone Off-Ramp	Diverge	7,043	C	25.1	0.71	C	20.0	0.85
Between S Glenstone Off-Ramp and On-Ramp	Basic	4,680	D	27.7	0.76	C	22.0	0.93
S Glenstone On-Ramp	Merge	4,686	D	28.7	0.88	C	26.4	1.12
Between S Glenstone On-Ramp and S National Off-Ramp	Basic	7,028	C	20.2	0.59	C	18.9	0.75
S National Off-Ramp	Diverge	4,686	C	26.9	0.88	C	24.8	1.12
Between S National Off-Ramp and On-Ramp	Basic	4,670	C	22.6	0.65	C	20.6	0.81
Between National On-Ramp and S Campbell Off-Ramp	Weave	5,555	C	24.5	0.67	C	25.9	0.82
Between S Campbell Off-Ramp and On-Ramp	Basic	4,656	B	17.0	0.50	C	19.1	0.70
S Campbell On-Ramp	Merge	4,675	C	20.3	0.66	C	22.3	0.86
Between S Campbell On-Ramp and MO-13 Off-Ramp	Basic	7,013	B	15.0	0.44	B	16.3	0.57
MO-13 Off-Ramp	Diverge	4,675	B	17.8	0.66	C	20.1	0.86
Between MO-13 Off-Ramp and On-Ramp	Basic	4,571	A	9.5	0.28	B	17.1	0.60
MO-13 On-Ramp	Merge	4,631	B	16.7	0.42	C	26.1	0.78
Between MO-13 On-Ramp and US-160 Off-Ramp	Basic	4,631	B	14.5	0.42	C	23.9	0.78
US-160 Off-Ramp	Diverge	4,631	B	15.8	0.42	C	26.3	0.78
Between US-160 Off-Ramp and US-160 On-Ramp	Basic	4,506	A	8.4	0.25	B	13.9	0.47
US-160 On-Ramp	Merge	4,599	B	14.3	0.34	B	19.3	0.54
Between US-160 On-Ramp and MO-413 Off-Ramp	Basic	4,599	B	11.8	0.34	B	16.3	0.54
MO-413 Off-Ramp	Diverge	4,599	A	8.1	0.34	B	13.6	0.54
Between MO-413 Off-Ramp and On-Ramp	Basic	4,513	A	8.9	0.26	A	8.8	0.29
MO-413 On-Ramp	Merge	4,544	B	10.9	0.28	B	11.1	0.32
Between MO-413 On-Ramp and Hwy MM Off-Ramp	Basic	4,544	A	9.6	0.28	A	9.8	0.32
Hwy MM Off-Ramp	Diverge	4,544	A	9.3	0.28	A	9.5	0.32
Between Hwy MM Off-Ramp and On-Ramp	Basic	4,521	A	7.5	0.22	A	6.5	0.21
Hwy MM On-Ramp	Merge	4,490	A	9.0	0.23	A	7.9	0.22
Between Hwy MM On-Ramp and I-44 EB Off-Ramp	Basic	4,490	A	7.7	0.23	A	6.7	0.22
I-44 EB Off-Ramp	Diverge	4,490	A	7.7	0.23	A	6.7	0.22
US 60 After I-44 EB Off-Ramp	Basic	2,273	B	12.2	0.36	B	11.8	0.39

2040 No-Build Mainline Analysis Tables cont.

US 60 East Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
US-60 Before Rte NN Off-Ramp	Basic	4,364	A	6.9	0.21	B	14.8	0.45
Rte NN Off-Ramp	Diverge	4,364	A	6.7	0.21	B	16.1	0.45
Between Rte NN Off-Ramp and On-Ramp	Basic	4,355	A	6.3	0.19	B	12.0	0.37
Rte NN On-Ramp	Merge	4,365	A	7.4	0.21	B	13.9	0.40
Between Rte NN On-Ramp and Farm Road 247 Off-Ramp	Basic	4,360	A	7.1	0.21	B	13.4	0.41
Farm Road 247 Off-Ramp	Diverge	4,360	B	12.7	0.21	C	20.3	0.41
US-60 After Farm Road 247 Off-Ramp	Basic	4,354	A	6.7	0.20	B	12.0	0.36

US 60 East Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
US-60 Before Farm Road 247 On-Ramp	Basic	4,364	B	13.6	0.43	A	8.5	0.27
Farm Road 247 On-Ramp	Merge	4,367	B	15.7	0.45	A	9.8	0.28
Between Farm Road 247 On-Ramp and Rte NN Off-Ramp	Basic	4,367	B	14.2	0.45	A	8.8	0.28
Rte NN Off-Ramp	Diverge	4,368	B	15.5	0.45	A	9.1	0.28
Between Rte NN Off-Ramp and On-Ramp	Basic	4,363	B	12.9	0.41	A	7.3	0.23
Rte NN On-Ramp	Merge	4,380	B	16.3	0.51	A	8.0	0.27
US-60 After Rte NN On-Ramp	Basic	4,380	B	16.2	0.51	A	8.5	0.27

2040 No-Build Mainline Analysis Tables cont.

I-44 Corridor – Eastbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
I-44 Before US-360 SB Off-Ramp	Basic	3,780	B	16.9	0.49	C	20.4	0.59
US-360 SB Off-Ramp	Diverge	3,780	B	13.9	0.49	B	18.0	0.59
Between US-360 SB Off-Ramp and NB On-Ramp	Basic	3,298	A	10.5	0.31	B	13.8	0.40
US-360 NB On-Ramp	Merge	3,476	B	12.6	0.35	B	15.3	0.43
Between US-360 NB On-Ramp and Hwy MM Off-Ramp	Basic	3,476	B	12.1	0.35	B	14.6	0.43
Hwy MM Off-Ramp	Diverge	3,476	B	16.2	0.35	B	19.3	0.43
Between Hwy MM Off-Ramp and Hwy MM On-Ramp	Basic	3,450	B	11.8	0.35	B	14.3	0.42
Hwy MM On-Ramp	Merge	3,764	B	19.6	0.46	B	19.2	0.46
Between Hwy MM On-Ramp and MO-266 Off-Ramp	Basic	3,764	B	15.9	0.46	B	15.9	0.46
MO-266 Off-Ramp	Diverge	3,764	B	18.3	0.46	B	18.3	0.46
Between MO-266 Off-Ramp and On-Ramp	Basic	3,511	B	12.2	0.35	B	13.6	0.40
MO-266 On-Ramp	Merge	3,751	B	19.7	0.48	B	19.7	0.48
Between MO-266 On-Ramp and West Bypass Off-Ramp	Basic	3,381	C	18.2	0.53	C	18.6	0.54
West Bypass Off-Ramp	Diverge	3,381	C	20.6	0.53	C	21.0	0.54
Between West Bypass Off-Ramp and On-Ramp	Basic	3,583	B	12.8	0.37	B	13.9	0.41
West Bypass On-Ramp	Merge	3,991	C	24.6	0.61	C	25.6	0.63
Between West Bypass On-Ramp and MO-13 Off-Ramp	Basic	3,991	C	21.0	0.61	C	21.9	0.63
MO-13 Off-Ramp	Diverge	3,991	C	25.5	0.61	C	26.5	0.63
Between MO-13 Off-Ramp and On-Ramp	Basic	3,903	C	18.1	0.53	C	18.9	0.55
MO-13 On-Ramp	Merge	4,067	C	27.4	0.69	D	29.1	0.73
Between MO-13 On-Ramp and Glenstone Off-Ramp	Basic	4,067	C	24.5	0.69	D	26.4	0.73
Glenstone Off-Ramp	Diverge	4,067	C	26.8	0.69	D	28.5	0.73
Between Glenstone Off-Ramp and On-Ramp	Basic	3,807	B	15.4	0.45	C	20.3	0.59
Glenstone On-Ramp	Merge	3,941	C	22.7	0.54	D	29.9	0.73
Between Glenstone On-Ramp and US-65 SB Off-Ramp	Basic	3,941	C	18.5	0.54	D	26.3	0.73
US-65 SB Off-Ramp	Diverge	3,941	C	21.2	0.54	D	29.0	0.73
Between US-65 SB Off-Ramp and SB On-Ramp	Basic	3,264	A	9.5	0.28	B	16.5	0.48
US-65 SB On-Ramp and NB Off-Ramp	Weave	4,333	A	8.2	0.26	B	14.5	0.42
Between US-65 NB Off-Ramp and NB On-Ramp	Basic	3,346	A	10.1	0.29	B	15.3	0.45
US-65 NB On-Ramp	Merge	3,788	B	18.0	0.44	D	28.2	0.71
Between US-65 NB On-Ramp and Farm Road 199 Off-Ramp	Basic	3,788	B	15.0	0.44	C	25.4	0.71
Farm Road 199 Off-Ramp	Diverge	3,788	B	16.1	0.44	C	27.2	0.71
Between Farm Road 199 Off-Ramp and On-Ramp	Basic	3,619	B	12.6	0.37	C	23.4	0.67
Farm Road 199 On-Ramp	Merge	3,643	B	15.8	0.39	C	27.5	0.70
Between Farm Road 199 On-Ramp and MO-125 Off-Ramp	Basic	3,643	B	13.3	0.39	C	25.1	0.70
MO-125 Off-Ramp	Diverge	3,643	B	13.9	0.39	C	26.9	0.70
Between MO-125 Off-Ramp and On-Ramp	Basic	3,463	A	11.0	0.32	C	21.4	0.62
MO-125 On-Ramp	Merge	3,570	B	16.0	0.39	C	27.2	0.69
I-44 After MO-125 On-Ramp	Basic	3,570	B	13.3	0.39	C	24.6	0.69

2040 No-Build Mainline Analysis Tables cont.

I-44 Corridor – Westbound

Description	Type	Adjusted Capacity (vph)	AM			PM		
			LOS	Density (veh/mi/ln)	D/C	LOS	Density (veh/mi/ln)	D/C
I-44 Before MO-125 Off-Ramp	Basic	3,780	A	10.7	0.31	B	11.8	0.34
MO-125 Off-Ramp	Diverge	3,780	A	3.6	0.31	A	4.9	0.34
Between MO-125 Off-Ramp and On-Ramp	Basic	3,658	A	8.6	0.25	A	9.2	0.27
MO-125 On-Ramp	Merge	3,982	B	15.1	0.38	B	13.8	0.34
Between MO-125 On-Ramp and Farm Road 199 Off-Ramp	Basic	3,982	B	12.9	0.38	B	11.8	0.34
Farm Road 199 Off-Ramp	Diverge	3,982	B	14.5	0.38	B	13.2	0.34
Between Farm Road 199 Off-Ramp and On-Ramp	Basic	3,927	B	11.3	0.33	B	11.0	0.32
Farm Road 199 On-Ramp	Merge	4,020	B	16.2	0.39	B	16.5	0.40
Between Farm Road 199 On-Ramp and US-65 NB Off-Ramp	Basic	4,020	B	13.5	0.39	B	13.8	0.40
US-65 NB Off-Ramp	Diverge	4,020	B	13.2	0.39	B	13.5	0.40
US-65 SB Off-Ramp	Diverge	3,913	B	16.0	0.33	B	16.3	0.34
Between US-65 SB Off-Ramp and US-65 On-Ramp	Basic	3,143	A	5.4	0.16	A	7.0	0.20
US-65 On-Ramp	Merge	4,179	B	16.3	0.52	C	23.6	0.72
Between US-65 On-Ramp and Glenstone Off-Ramp	Basic	4,179	B	18.0	0.52	D	26.0	0.72
Glenstone Off-Ramp	Diverge	4,179	C	24.3	0.52	D	32.6	0.72
Between Glenstone Off-Ramp and On-Ramp	Basic	4,059	B	14.3	0.42	C	20.9	0.60
Glenstone On-Ramp	Merge	4,161	C	20.8	0.51	D	31.3	0.79
Between Glenstone On-Ramp and MO-13 Off-Ramp	Basic	4,161	B	17.3	0.51	D	29.3	0.79
MO-13 Off-Ramp	Diverge	4,161	B	18.9	0.51	D	30.5	0.79
Between MO-13 Off-Ramp and On-Ramp	Basic	3,976	B	11.7	0.34	C	20.9	0.60
MO-13 On-Ramp	Merge	4,067	B	17.8	0.41	D	28.7	0.70
Between MO-13 On-Ramp and West Bypass Off-Ramp	Basic	4,067	B	14.0	0.41	C	25.1	0.70
West Bypass Off-Ramp	Diverge	4,067	B	16.2	0.41	D	28.3	0.70
Between West Bypass Off-Ramp and On-Ramp	Basic	3,729	A	9.2	0.27	B	16.3	0.47
West Bypass On-Ramp	Merge	3,499	B	14.0	0.35	C	22.4	0.58
Between West Bypass On-Ramp and Kearney On-Ramp	Basic	3,499	B	12.0	0.35	C	20.1	0.58
Kearney On-Ramp	Merge	3,913	B	16.0	0.34	C	24.3	0.56
Between Kearney On-Ramp and MO-266 Off-Ramp	Basic	3,913	B	11.8	0.34	C	19.3	0.56
MO-266 Off-Ramp	Diverge	3,913	B	13.7	0.34	C	22.6	0.56
Between MO-266 Off-Ramp and On-Ramp	Basic	3,772	A	9.6	0.28	B	14.8	0.43
MO-266 On-Ramp	Merge	3,884	A	9.3	0.35	B	15.3	0.51
Between MO-266 On-Ramp and Hwy MM Off-Ramp	Basic	3,884	B	11.8	0.35	B	17.4	0.51
Hwy MM Off-Ramp	Diverge	3,884	B	14.9	0.35	C	21.6	0.51
Between Hwy MM Off-Ramp and On-Ramp	Basic	3,772	A	10.5	0.31	B	14.3	0.42
Hwy MM On-Ramp	Merge	3,794	B	12.9	0.31	B	17.1	0.43
Between Hwy MM On-Ramp and US-360 SB Off-Ramp	Basic	3,794	A	10.8	0.31	B	14.6	0.43
US-360 SB Off-Ramp	Diverge	3,794	A	9.9	0.31	B	14.6	0.43
Between US-360 SB Off-Ramp and US-360 NB On-Ramp	Basic	3,729	A	10.0	0.29	B	13.1	0.38
US-360 NB On-Ramp	Merge	4,042	B	16.6	0.47	C	20.5	0.57
I-44 After US-360 NB On-Ramp	Merge	4,042	B	16.2	0.47	B	19.8	0.57

2040 No-Build Intersection Analysis Tables

US 60 Corridors

Synchro ID	Intersection	AM		PM	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
US 60 West Corridor					
118*	US 60 WB Ramps & Hwy MM	F	64.3	E	42.4
115*	US 60 EB Ramps & Hwy MM	F	319.1	F	82.2
6	US 60 WB Ramps & Sunshine St	A	8.8	B	19.7
12	US 60 EB Ramps & Sunshine St	A	6.5	A	8.4
17	US 60 WB Ramps & West Bypass	B	14.6	C	33.6
20	US 60 EB Ramps & West Bypass	B	15.8	B	12.4
88	US 60 WB Ramps & Kansas Expwy	C	25.3	C	25.7
93	US 60 EB Ramps & Kansas Expwy	B	17	C	33
95	US 60 EB Ramps Right & Kansas Expwy	A	4.1	A	4.8
31	Campbell Ave & Republic Rd	F	90.1	F	169.4
28	Campbell Ave & US 60 WB Ramps	A	8.6	C	20.4
24	Campbell Ave & US 60 EB Ramps	B	13.7	A	7.1
36	Campbell Ave & El Camino Alto	C	24.4	C	26.3
56*	US 60 & National Ave WB On-Ramp	A	0	A	0
64	US 60 & National Ave WB Off-Ramp Left	F	1168.5	F	238.7
66	US 60 & National Ave North DDI Intersection	F	89.4	F	149.3
68	US 60 & National Ave WB Off-Ramp Right	B	16.8	B	12.5
62*	US 60 & National Ave EB On-Ramp	B	12	F	225
77	US 60 & National Ave EB Off-Ramp Left	C	23.5	B	17.4
79	US 60 & National Ave South DDI Intersection	F	148.6	E	76.8
81	US 60 & National Ave EB Off-Ramp Right	B	11.7	D	43.5
46	US 60 WB Ramps & Glenstone Ave	E	59	F	151
43	US 60 EB Ramps & Republic Rd/Glenstone	C	20.5	D	47.8
US 60 East Corridor					
5*	US 60 & Highland Springs Blvd (N)	F	103.2	C	20.2
6*	US 60 & Highland Springs Blvd (S)	F	54.8	F	2249.6
8*	US 60 & Farm Rd 189 (N)	F	1219.6	E	38.8
9*	US 60 & Farm Rd 189 (S)	E	36.2	F	553.8
12*	US 60 & Farm Rd 193 (N)	F	862.8	F	88.3
13*	US 60 & Farm Rd 193 (S)	D	27.6	F	493.5
60*	US 60 WB Ramps & Route NN/J	F	93.4	C	18
63*	US 60 EB Ramps & Route NN/J	B	14.5	B	14.6
16*	US 60 & Farm Rd 205 (N)	F	80.2	E	38.1
17*	US 60 & Farm Rd 205 (S)	C	23.5	F	123.1
20*	US 60 & Farm Rd 213 (N)	F	85.5	D	26
21*	US 60 & Farm Rd 213 (S)	C	16.5	E	42.1
24*	US 60 & Farm Rd 219 (N)	F	180.5	D	26.1
25*	US 60 & Farm Rd 219 (S)	C	19.1	F	50
29*	US 60 & Farm Rd 223 (N)	F	275.2	D	31
30*	US 60 & Farm Rd 223 (S)	C	17.1	D	33.2
33*	US 60 & Farm Rd 229 (N)	F	192.2	D	28.1
34*	US 60 & Farm Rd 229 (S)	B	13	C	19.9
36	US 60 & Hwy 125 (N)	F	1791.9	F	315
37	US 60 & Hwy 125 (S)	F	289.1	F	363.1
40*	US 60 & Farm Rd 241 (N)	D	26.8	A	0
41*	US 60 & Farm Rd 241 (S)	C	24.4	C	22.4
53*	US 60 EB Off-Ramp & Farm Rd 247	A	8.1	A	9.3

*At unsignalized intersections, LOS and delay for the worst movement is shown.

2040 No-Build Intersection Analysis Tables cont.

I-44 Corridor

Synchro ID	Intersection	AM		PM	
		LOS	Delay (s/veh)	LOS	Delay (s/veh)
117*	I-44 WB Ramps & Hwy MM	E	38	F	244.6
113*	I-44 EB Ramps & Hwy MM	C	22	D	30.2
101	I-44 WB Ramps & Chestnut Expwy	B	12.1	B	15.4
96	I-44 EB Ramps & Chestnut Expwy	B	11.4	B	13.9
85	I-44 WB Ramps & West Bypass	D	41.3	B	11.7
81	I-44 EB Ramps & West Bypass	A	6.2	B	10.5
54	I-44 & Route 13 EB Off-Ramp Right	A	3	A	1.9
62	I-44 & Route 13 South DDI Intersection	B	16.6	C	27
65	I-44 & Route 13 WB Off-Ramp Right	A	5.5	B	18.3
66	I-44 & Route 13 North DDI Intersection	C	21.3	C	24.4
67*	I-44 & Route 13 WB Off-Ramp Left	F	74.3	C	22.2
59*	I-44 & Route 13 WB On-Ramp	A	9.9	B	11.3
40	I-44 WB Ramps & Glenstone Ave	C	20.9	B	19.5
36	I-44 EB Ramps & Glenstone Ave	C	25.3	B	19.2
26*	I-44 WB Ramps & N Mulroy Rd	F	174.6	F	508
17*	I-44 EB Ramps & N Mulroy Rd	D	28.8	C	20.2
8*	I-44 WB Ramps & Hwy 125	F	7458	F	1695.9
7	I-44 EB Ramps & Hwy 125	B	16.6	B	13.9

*At unsignalized intersections, LOS and delay for the worst movement is shown.

Appendix D

Roadway Analysis Tables

US 60 West Corridor
Roadway Tables

J8P3032 : JAMES RIVER FREEWAY (360/60) HORIZONTAL GEOMETRICS

Corridor Information									Horizontal Geometrics			Horizontal Design Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
CD-3690	4	29	Ramp 1- WB 360-WB 44	04+53.67	0.09	40	40	0	1301	574	8.0%	600	444	8.0%
CD-3690	4	29	Ramp 1- WB 360-WB 44	07+51.80	0.01	40	40	0	876	984	6.8%	600	761	6.8%
CD-3690	4	29	Ramp 2- EB 44-EB 360	02+87.52	0.03	40	40	0	1579	1148	7.6%	600	583	7.6%
CD-3690	4	29	Ramp 3- WB 44-EB 360 Loop Ramp	00+67.29	0.04	40	35	5	407	427	8.0%	600	444	8.0%
CD-3690	4	29	Ramp 3- WB 44-EB 360 Loop Ramp	04+16.17	0.04	40	35	5	902	377	8.0%	600	444	8.0%
CD-3690	4	29	Ramp 3- WB 44-EB 360 Loop Ramp	04+85.33	0.03	40	35	5	499	427	8.0%	600	444	8.0%
CD-3690	4	29	Ramp 4- WB 360-EB 44	04+26.06	0.16	40	40	0	2028	1148	7.6%	600	583	7.6%
CD-3690	9	34	ML Curve 1	10+62.20	0.67 Rt.	70	65	5	1208	3822	4.8%	2100	4100	4.8%
CD-3690	14	39	Ramp 1- MM-WB 360	00+46.63	1.62	40	40	0	305	1493	5.8%	600	1030	5.8%
CD-3690	14	39	Ramp 2- EB 360-MM	00+65.65	1.67	40	40	0	424	968	7.6%	600	583	7.6%
CD-3690	14	39	Ramp 2- EB 360-MM	03+18.62	1.82	25	25	0	600	968	7.6%	375	182	7.6%
CD-3690	14	39	Ramp 3- WB 360-MM	01+59.42	1.94	25	25	0	600	968	7.6%	375	182	7.6%
CD-3690	14	39	Ramp 3- WB 360-MM	04+08.42	2.08	40	40	0	424	968	7.6%	600	583	7.6%
CD-3690	14	39	Ramp 4- MM-EB 360	03+91.36	2.16	40	40	0	305	1493	5.8%	600	1030	5.8%
CD-3690	23	48	ML Curve 2	44+83.54	2.80 Rt.	70	65	5	1106	2871	6.0%	2100	3150	6.0%
CD-3690	25	50	Ramp 1- Sunshine-WB 360	00+68.66	3.44	40	40	0	443	968	7.6%	600	583	7.6%
CD-3690	25	50	Ramp 1- Sunshine-WB 360	03+34.88	3.59	40	40	0	662	968	7.6%	600	583	7.6%
CD-3690	25	50	Ramp 2- EB 360-Sunshine	00+57.15	3.44	40	40	0	372	1280	6.6%	600	808	6.6%
CD-3690	25	50	ML Curve 3	59+40.68	3.83 Rt.	70	65	5	1081	6548	3.0%	2100	6930	3.0%
6-3.331	3	13	Ramp 3- WB 360-Sunshine	07+67.28	3.84	40	35	5	1178	2292	3.0%	600	2510	3.0%
6-3.331	3	13	Ramp 4- Sunshine-EB 360	06+28.26	3.72	40	35	5	866	955	6.0%	600	965	6.0%
6-3.331	3	13	Ramp 4- Sunshine-EB 360	14+42.39	3.85	40	20	20	420	955	2.6%	600	2960	2.6%
6-3.331	3	13	ML Curve 4	30+81.23	77.90 Rt.	70	60	10	2667	6548	2.6%	2100	8090	2.6%
6-3.331	7	17	ML Curve 5	91+27.60	78.88 Lt.	70	55	15	2632	3820	4.0%	2100	5050	4.0%
6-3.331	9	19	Ramp 1- FF-WB 60	01+09.67	79.49	40	25	15	218	955	4.0%	600	1770	4.0%
6-3.331	9	19	Ramp 2- EB 60-FF	01+59.11	79.51	40	25	15	315	955	4.0%	600	1770	4.0%

J8P3032 : JAMES RIVER FREEWAY (360/60) HORIZONTAL GEOMETRICS

Corridor Information									Horizontal Geometrics			Horizontal Design Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
6-3.331	9	19	Ramp 2- EB 60-FF	10+68.69	79.68	25	25	0	406	955	8.0%	375	134	8.0%
6-3.331	9	19	Ramp 3- WB 60-FF	05+21.17	79.81	40	40	0	521	955	8.0%	600	444	8.0%
6-3.331	9	19	Ramp 3- WB 60-FF	11+94.24	79.92	25	25	0	431	955	8.0%	375	134	8.0%
6-3.331	9	19	Ramp 4- FF-EB 60	08+59.72	79.92	40	40	0	282	955	8.0%	600	444	8.0%
6-3.331	13	23	ML Curve 6	185+32.27	80.66 Rt.	70	55	15	1369	2292	6.0%	2100	3150	6.0%
6-3.331	15	27	Ramp 1- Kansas Ave-WB 60	01+89.27	82.16	40	40	0	377	1910	4.0%	600	1770	4.0%
6-3.331	15	27	Ramp 2- EB 60-Kansas Ave	02+70.63	82.18	40	40	0	538	1910	4.0%	600	1770	4.0%
8-3.286	5	21	Ramp 3- WB 60-Kansas Ave	08+90.00	82.51	40	40	0	1058	1910	5.0%	600	1310	5.0%
8-3.286	5	21	Ramp 3- WB 60-Kansas Ave	18+19.89	82.67	25	25	0	320	1910	5.0%	375	499	5.0%
8-3.286	5	21	Ramp 4- Kansas Ave- EB 60	10+42.69	82.58	40	40	0	1070	1910	5.0%	600	1310	5.0%
6-3.331	16	28	ML Curve 7	52+56.52	82.46 Lt.	70	55	15	1907	2865	5.0%	2100	3910	5.0%
8-3.286	11	27	ML Curve 8	101+98.28	83.38 Rt.	70	60	10	1788	1910	7.0%	2100	2580	7.0%
8-3.286	12	28	Ramp 1- Campbell Ave-WB 60	02+02.06	83.59	40	35	5	400	1146	5.0%	600	1310	5.0%
8-3.286	12	28	Ramp 1- Campbell Ave-WB 60	12+05.79	83.77	25	25	0	532	1146	5.0%	375	499	5.0%
8-3.286	12	28	Ramp 3- WB 60-Campbell Ave	11+64.72	84.05	40	30	10	343	1910	3.0%	600	2510	3.0%
8-3.286	12	28	Ramp 4- Campbell Ave- EB 60	05+13.96	83.9	25	25	0	556	1146	5.0%	375	499	5.0%
8-3.286	12	28	Ramp 4- Campbell Ave- EB 60	13+86.03	84.05	40	35	5	380	1146	5.0%	600	1310	5.0%
10-3.352	5	23	Ramp 1- National Ave-WB 60	03+36.76	84.7	40	30	10	667	1910	3.0%	600	2510	3.0%
10-3.352	5	23	Ramp 1- National Ave-WB 60	12+15.99	84.84	25	25	0	541	1146	5.0%	375	499	5.0%
10-3.352	5	23	Ramp 2- EB 60-National Ave	02+23.52	84.63	40	40	0	446	2546	3.0%	600	2510	3.0%
10-3.352	5	23	Ramp 3- WB 60-National Ave	11+35.58	85.1	40	35	5	498	3274	2.0%	600	3970	2.0%
10-3.352	5	23	Ramp 4- National Ave-EB 60	03+21.48	84.95	25	25	0	327	1910	3.0%	375	1070	3.0%
10-3.352	5	23	Ramp 4- National Ave-EB 60	09+30.71	85.06	40	40	0	532	1146	6.0%	600	965	6.0%
10-3.352	5	23	ML Curve 9	182+17.83	84.95 Lt.	70	55	15	1091	2865	5.0%	2100	3910	5.0%
13-3.297	5	16	ML Curve 10	210+42.00	85.49 Lt.	70	55	15	1390	5730	2.6%	2100	8090	2.6%
14-CD10753	3	23	Ramp 2- EB 60-Republic Rd	02+01.31	85.98	40	40	0	400	1432	6.4%	600	857	6.4%

J8P3032 : JAMES RIVER FREEWAY (360/60) HORIZONTAL GEOMETRICS

Corridor Information									Horizontal Geometrics			Horizontal Design Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
14-CD10753	4	24	Ramp 2- EB 60-Republic Rd	08+57.57	86.1	25	20	5	825	764	3.6%	375	845	3.6%
14-CD10753	4	24	Ramp 5- Republic Rd-EB 60	06+65.07	86.13	40	15	25	651	477	4.0%	600	1770	4.0%
14-CD10753	4	24	Ramp 5- Republic Rd-EB 60	11+31.63	86.16	40	40	0	400	955	8.0%	600	444	8.0%
13-3.297	9	20	Ramp 1- Bus 60-WB 360	01+25.32	86.06	40	30	10	250	1432	4.0%	600	1770	4.0%
13-3.297	9	20	Ramp 3- WB 360-Bus 60	05+33.56	86.4	35	35	0	677	1637	4.0%	525	1370	4.0%
13-3.297	9	20	Ramp 4- Bus 60-EB 360	07+32.67	86.46	40	40	0	635	955	7.0%	600	716	7.0%
15-CD10233	4	62	WB ML Curve 1	263+57.39	86.49 Lt.	70	55	15	1379	2292	6.0%	2100	3150	6.0%
15-CD10233	4	62	EB ML Curve 1	263+58.72	87.06 Lt.	70	60	10	1235	2083	7.0%	2100	2580	7.0%
15-CD10233	6	64	WB ML Curve 2	173+44.00	87.41 Rt.	70	60	10	1135	2145	7.0%	2100	2580	7.0%
15-CD10233	6	64	EB ML Curve 2	173+48.29	87.70 Rt.	70	60	10	1067	1915	7.0%	2100	2580	7.0%
15-CD10233	6	64	EB ML Curve 3	182+90.68	88.49 Lt.	70	70	0	119	16963	2.0%	2100	10700	2.0%
15-CD10233	6	64	WB ML Curve 3	183+24.94	88.50 Rt.	70	70	0	50	17037	2.0%	2100	10700	2.0%
15-CD10233	13	71	65 Ramp N-W	604+63.16	87.97	40	40	0	867	1000	7.6%	600	583	7.6%
15-CD10233	13	71	65 Ramp N-W	614+53.84	87.67	40	40	0	492	806	7.6%	600	583	7.6%
15-CD10233	25	83	65 Ramp S-W	303+35.92	87.91	40	40	0	698	1000	7.6%	600	583	7.6%
15-CD10233	6	64	ML Curve 11	204+21.70	87.70	70	70	0	1800	17000	6.2%	2100	3020	6.2%
15-CD10233	6	64		204+21.70	87.70	70	60	10	587	2260	6.2%	2100	3020	6.2%
15-CD10233	25	83	65 Ramp S-W	339+25.56	88.08	40	40	0	2486	1018	6.0%	600	965	6.0%
15-CD10233	13	71	65 Ramp S-W	346+18.57	87.49	40	40	0	349	1930	4.6%	600	1470	4.6%
15-CD10233	22	80	65 Ramp W-N	222+47.00	87.88	45	40	5	2182	1161	5.6%	675	1390	5.6%
15-CD10233	22	80	65 Ramp W-N	237+45.64	87.83	45	45	0	552	2000	5.2%	675	1560	5.2%
15-CD10233	13	71	65 Ramp E-N	500+37.53	87.99	45	35	10	75	716	6.8%	675	990	6.8%
15-CD10233	13	71	65 Ramp E-N	509+71.21	87.82	45	45	0	774	1000	7.6%	675	765	7.6%
15-CD10233	13	71	65 Ramp W-S	106+67.86	87.75	20	20	0	1022	3820	3.0%	300	730	3.0%
15-CD10233	13	71	65 Ramp W-S	117+64.57	87.83	20	20	0	326	1280	5.4%	300	258	5.4%
15-CD10233	13	71	65 Ramp E-S	00+70.62	87.72	20	20	0	140	430	5.6%	300	236	5.6%

J8P3032 : JAMES RIVER FREEWAY (360/60) HORIZONTAL GEOMETRICS

Corridor Information									Horizontal Geometrics			Horizontal Design Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
15-CD10233	13	71	65 Ramp E-S	01+90.92	87.72	20	15	5	100	215	5.6%	300	236	5.6%
15-CD10233	13	71	65 Ramp E-S	02+91.94	87.72	20	15	5	100	150	5.6%	300	236	5.6%
15-CD10233	13	71	65 Ramp E-S	04+68.09	87.72	20	15	5	231	215	5.6%	300	236	5.6%
15-CD10233	13	71	65 Ramp E-S	06+73.72	87.72	20	20	0	180	150	7.2%	300	125	7.2%
15-CD10233	13	71	65 Ramp E-S	08+02.02	87.72	20	20	0	100	215	7.2%	300	125	7.2%
15-CD10233	13	71	65 Ramp E-S	09+21.72	87.72	20	20	0	140	430	7.2%	300	125	7.2%
15-CD10233	13	71	65 Ramp N-E	00+70.63	87.83	20	15	5	140	430	-2.0%	300	1640	-2.0%
15-CD10233	13	71	65 Ramp N-E	01+90.92	87.83	20	15	5	100	215	-2.0%	300	1640	-2.0%
15-CD10233	13	71	65 Ramp N-E	03+22.74	87.83	20	15	5	152	158	-2.0%	300	1640	-2.0%
15-CD10233	25	83	65 Ramp S-E	403+76.97	87.87	40	40	0	721	1000	7.6%	600	583	7.6%
15-CD10233	13	71	WB ML Curve 4	205+28.13	87.70	70	70	0	547	2430	6.2%	2100	3020	6.2%
15-CD10233	13	71	EB ML Curve 4	206+05.82	87.70	70	70	0	17	16963	6.2%	2100	3020	6.2%
15-CD10233	13	71		206+05.82	87.70	70	70	0	496	2490	6.2%	2100	3020	6.2%

J8P3032 JAMES RIVER FREEWAY (360/60) VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics				Vertical Design Criteria							
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
CD-3690	5	30	Ramp 1- WB 360-WB 44	00+75.00	40	40	0	C	902.23	-0.30	-2.00	393.70	1.70	43.10	120.00	530.72	305	1085.82	0.00
CD-3690	5	30	Ramp 1- WB 360-WB 44	05+66.30	40	40	0	S	459.32	-2.00	0.69	170.60	2.69	63.40	120.00	170.69	305	N/A	92.59
CD-3690	5	30	Ramp 1- WB 360-WB 44	08+25.75	40	40	0	C	328.08	0.69	-1.95	124.67	2.65	43.10	120.00	124.04	305	571.98	0.00
CD-3690	5	30	Ramp 2- EB 44-EB 360	00+37.50	40	40	0	C	246.06	0.07	-1.30	180.45	1.37	43.10	120.00	179.22	305	908.90	0.00
CD-3690	5	30	Ramp 2- EB 44-EB 360	01+39.99	40	40	0	S	393.70	-1.30	2.80	95.14	4.10	63.40	120.00	96.07	305	N/A	141.01
CD-3690	5	30	Ramp 2- EB 44-EB 360	03+65.03	40	40	0	C	295.28	2.80	1.05	167.32	1.75	43.10	120.00	168.83	305	764.56	0.00
CD-3690	5	30	Ramp 2- EB 44-EB 360	04+48.89	40	40	0	C	213.25	1.05	-0.30	157.48	1.35	43.10	120.00	158.08	305	906.48	0.00
CD-3690	5	30	Ramp 3- WB 44-EB 360 Loop Ramp	00+22.50	40	40	0	C	147.64	0.63	-1.53	68.24	2.16	43.10	120.00	68.26	305	572.66	0.00
CD-3690	5	30	Ramp 3- WB 44-EB 360 Loop Ramp	02+18.11	40	40	0	S	295.28	-1.53	2.00	82.02	3.53	63.40	120.00	83.60	305	N/A	121.53
CD-3690	5	30	Ramp 3- WB 44-EB 360 Loop Ramp	07+06.34	40	40	0	C	902.23	2.00	-0.30	393.70	2.30	43.10	120.00	392.27	305	920.25	0.00
CD-3690	5	30	Ramp 4- WB 360-EB 44	00+37.50	40	40	0	C	246.06	0.30	-1.07	180.45	1.37	43.10	120.00	180.13	305	912.93	0.00
CD-3690	5	30	Ramp 4- WB 360-EB 44	01+30.00	40	40	0	C	295.28	-1.07	-2.70	180.45	1.64	43.10	120.00	180.16	305	805.97	0.00
CD-3690	5	30	Ramp 4- WB 360-EB 44	05+00.00	40	40	0	S	442.91	-2.70	2.01	95.14	4.71	63.40	120.00	94.04	305	N/A	162.06
CD-3690	5	30	Ramp 4- WB 360-EB 44	05+93.17	40	40	0	C	164.04	2.01	0.56	114.83	1.45	43.10	120.00	113.45	305	828.22	0.00
CD-3690	3	28	ML Curve 1	01+50.00	70	70	0	C	902.23	2.00	-0.30	393.70	2.30	246.90	210.00	392.27	730	920.25	0.00
CD-3690	9	34	ML Curve 2	07+00.00	70	70	0	S	295.28	-0.30	0.44	396.98	0.74	180.30	210.00	397.95	730	N/A	78.19
CD-3690	9	34	ML Curve 3	12+00.00	70	70	0	C	295.28	0.44	-0.40	351.05	0.84	246.90	210.00	350.68	730	1429.11	0.00
CD-3690	11	36	ML Curve 4	16+28.00	70	70	0	S	295.28	-0.40	0.43	354.33	0.83	180.30	210.00	355.33	730	N/A	87.57
CD-3690	12	37	ML Curve 5	21+00.00	70	70	0	C	295.28	0.43	-0.37	370.73	0.80	246.90	210.00	370.48	730	1501.46	0.00
CD-3690	15	40	Ramp 1- MM-WB 360	00+30.00	40	40	0	C	196.85	-0.37	-1.18	239.50	0.82	43.10	120.00	240.94	305	1419.11	0.00
CD-3690	15	40	Ramp 1- MM-WB 360	01+40.00	40	40	0	S	410.10	-1.18	2.66	108.27	3.84	63.40	120.00	106.74	305	N/A	132.20
CD-3690	15	40	Ramp 1- MM-WB 360	03+82.00	40	40	0	C	262.47	2.66	1.00	157.48	1.66	43.10	120.00	158.30	305	782.02	0.00
CD-3690	15	40	Ramp 2- EB 360-MM	00+25.00	40	40	0	C	164.04	-0.38	-1.69	124.67	1.31	43.10	120.00	125.22	305	905.69	0.00
CD-3690	15	40	Ramp 2- EB 360-MM	01+60.00	40	40	0	S	475.72	-1.69	2.67	108.27	4.37	63.40	120.00	108.94	305	N/A	150.26
CD-3690	15	40	Ramp 2- EB 360-MM	04+13.20	25	25	0	C	295.28	2.67	1.00	177.17	1.68	11.10	75.00	176.28	155	791.82	0.00
CD-3690	15	40	Ramp 3- WB 360-MM	00+73.30	25	25	0	C	393.70	-1.00	-3.93	134.51	2.93	11.10	75.00	134.60	155	565.74	0.00
CD-3690	15	40	Ramp 3- WB 360-MM	03+22.04	40	40	0	S	524.93	-3.93	2.60	82.02	6.52	63.40	120.00	80.49	305	N/A	224.41

J8P3032 JAMES RIVER FREEWAY (360/60) VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics				Vertical Design Criteria							
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
CD-3690	15	40	Ramp 3- WB 360-MM	04+56.96	40	30	10	C	98.43	2.60	2.33	374.02	0.26	43.10	120.00	372.82	305	4136.33	0.00
CD-3690	15	40	Ramp 4- MM-EB 360	00+53.00	40	40	0	C	262.47	-1.00	-3.50	104.99	2.50	43.10	120.00	105.03	305	563.01	0.00
CD-3690	15	40	Ramp 4- MM-EB 360	02+75.00	40	40	0	S	557.74	-3.50	3.20	82.02	6.70	63.40	120.00	83.21	305	N/A	230.64
CD-3690	15	40	Ramp 4- MM-EB 360	04+22.67	40	30	10	C	98.43	3.20	2.55	150.92	0.65	43.10	120.00	151.19	305	1706.66	0.00
CD-3690	13	38	ML Curve 6	33+31.00	70	70	0	S	590.55	-0.37	2.56	203.41	2.92	180.30	210.00	202.11	730	N/A	307.91
CD-3690	21	46	ML Curve 7	40+76.32	70	70	0	C	1476.38	2.56	-2.56	288.71	5.12	246.90	210.00	288.52	730	789.07	0.00
CD-3690	23	48	ML Curve 8	44+72.60	70	70	0	S	459.32	-2.56	-0.30	203.41	2.26	180.30	210.00	203.15	730	N/A	238.26
CD-3690	24	49	ML Curve 9	51+25.00	70	70	0	C	492.13	-0.30	-0.91	813.65	0.61	246.90	210.00	813.43	730	2029.53	0.00
CD-3690	24	49	ML Curve 10	55+00.00	70	70	0	S	656.17	-0.91	1.10	328.08	2.01	180.30	210.00	327.27	730	N/A	211.28
CD-3827	14	23	Ramp 1- Sunshine-WB 360	00+50.83	40	40	0	C	295.28	-0.27	-2.04	167.32	1.76	43.10	120.00	167.58	305	760.01	0.00
CD-3827	14	23	Ramp 1- Sunshine-WB 360	03+90.00	40	40	0	S	295.28	-2.04	1.00	98.43	3.04	63.40	120.00	97.26	305	N/A	104.46
CD-3827	14	23	Ramp 2- EB 360-Sunshine	00+89.97	40	40	0	C	295.28	-0.27	-2.14	157.48	1.86	43.10	120.00	158.49	305	726.81	0.00
CD-3827	14	23	Ramp 2- EB 360-Sunshine	02+71.60	25	25	0	S	328.08	-2.14	1.00	104.99	3.14	25.50	75.00	104.59	155	N/A	42.16
6-3.331	5	15	Ramp 3- WB 360-Sunshine	01+30.00	25	25	0	S	234.00	-0.50	2.40	81.00	2.90	25.50	75.00	80.69	155	N/A	38.98
6-3.331	5	15	Ramp 3- WB 360-Sunshine	06+30.51	40	40	0	C	636.00	2.40	-1.45	165.00	3.85	43.10	120.00	165.19	305	597.07	0.00
6-3.331	5	15	Ramp 4- Sunshine-EB 360	01+25.00	40	40	0	S	220.00	-1.00	1.00	110.00	2.00	63.40	120.00	110.00	305	N/A	68.82
6-3.331	5	15	Ramp 4- Sunshine-EB 360	09+48.48	40	40	0	C	1000.00	1.00	-1.35	425.00	2.35	43.10	120.00	425.53	305	958.28	0.00
CD-3690	25	50	ML Curve 11	58+55.07	70	70	0	C	813.65	1.10	-2.00	262.47	3.10	246.90	210.00	262.47	730	752.60	0.00
CD-3827	14	23	WB ML Curve 1	60+25.00	70	50	20	C	164.04	-2.00	-2.11	1532.15	0.11	246.90	210.00	1518.91	730	10072.76	0.00
CD-3827	14	23	WB ML Curve 2	60+75.00	70	50	20	S	164.04	-2.11	-2.00	1509.19	0.11	180.30	210.00	1518.91	730	N/A	11.38
CD-3827	14	23	EB ML Curve 1	60+25.00	70	50	20	C	164.04	-2.00	-2.42	393.70	0.42	246.90	210.00	394.33	730	2675.77	0.00
CD-3827	14	23	EB ML Curve 2	60+75.00	70	50	20	S	164.04	-2.42	-2.00	393.70	0.42	180.30	210.00	394.33	730	N/A	43.84
6-3.331	4	14	ML Curve 12	31+00.17	70	70	0	S	300.00	-2.00	-1.70	1000.00	0.30	180.30	210.00	1000.00	730	N/A	31.61
6-3.331	7	17	ML Curve 13	83+00.00	70	70	0	S	1100.00	-1.70	0.40	524.00	2.10	180.30	210.00	523.81	730	N/A	221.29
6-3.331	10	20	ML Curve 14	127+56.30	70	70	0	S	1500.00	0.40	2.00	938.00	1.60	180.30	210.00	937.50	730	N/A	168.60
6-3.331	11	21	Ramp 1- FF-WB 60	03+95.90	40	35	5	S	250.00	0.50	5.50	56.00	5.00	63.40	120.00	50.00	305	N/A	172.04
6-3.331	11	21	Ramp 1- FF-WB 60	10+25.45	25	25	0	C	280.00	5.50	1.00	62.20	4.50	11.10	75.00	62.22	155	379.78	0.00
6-3.331	11	21	Ramp 2- EB 60-FF	04+51.90	40	35	5	S	250.00	0.50	5.00	55.60	4.50	63.40	120.00	55.56	305	N/A	154.84
6-3.331	11	21	Ramp 2- EB 60-FF	12+80.27	25	25	0	C	350.00	5.00	1.00	87.50	4.00	11.10	75.00	87.50	155	444.75	0.00
6-3.331	11	21	Ramp 3- WB 60-FF	11+00.00	40	35	5	S	200.00	-0.45	3.57	49.80	4.02	63.40	120.00	49.75	305	N/A	138.32

J8P3032 JAMES RIVER FREEWAY (360/60) VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics				Vertical Design Criteria							
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
6-3.331	11	21	Ramp 4- FF-EB 360	02+79.52	40	40	0	C	200.00	-0.30	-4.50	47.60	4.20	43.10	120.00	47.62	305	356.90	0.00
6-3.331	11	21	Ramp 4- FF-EB 360	11+00.00	25	25	0	S	450.00	-4.50	4.00	52.90	8.50	25.50	75.00	52.94	155	N/A	114.25
4-3.324	9	24	ML Curve 15	157+10.00	70	70	0	C	1400.00	2.00	0.80	1167.00	1.20	246.90	210.00	1166.67	730	1599.17	0.00
6-3.331	13	23	ML Curve 16	189+40.00	70	70	0	S	1000.00	0.80	1.20	2500.00	0.40	180.30	210.00	2500.00	730	N/A	42.15
6-3.331	14	26	ML Curve 17	210+50.00	70	70	0	C	1000.00	1.20	-0.40	625.00	1.60	246.90	210.00	625.00	730	1174.38	0.00
6-3.331	15	29	ML Curve 18	39+76.00	70	70	0	C	600.00	-0.40	-1.30	667.00	0.90	246.90	210.00	666.67	730	1498.89	0.00
6-3.331	15	29	Ramp 1- Kansas Ave-WB 60	04+06.00	40	40	0	S	380.00	-1.00	2.58	106.00	3.58	63.40	120.00	106.15	0	N/A	123.18
6-3.331	15	29	Ramp 1- Kansas Ave-WB 60	10+12.00	40	40	0	C	300.00	2.58	1.00	189.00	1.58	43.10	120.00	189.87	305	832.91	0.00
6-3.331	15	29	Ramp 2- EB 60-Kansas Ave	04+05.98	40	40	0	S	220.00	-1.30	0.68	110.00	1.98	63.40	120.00	111.00	0	N/A	68.20
6-3.331	15	29	Ramp 2- EB 60-Kansas Ave	08+94.31	25	25	0	S	300.00	0.68	1.50	375.00	0.82	25.50	75.00	367.20	0	N/A	10.98
6-3.331	15	29	ML Curve 19	45+23.50	70	70	0	S	300.00	-1.30	-1.06	1250.00	0.24	180.30	210.00	1250.00	0	N/A	25.29
8-3.286	8	24	Ramp 3- WB 360-Kansas Ave	03+26.29	25	25	0	C	400.00	-1.00	-3.20	182.00	2.20	11.10	75.00	181.82	155	690.45	0.00
8-3.286	8	24	Ramp 3- WB 360-Kansas Ave	14+75.00	40	40	0	S	300.00	-3.20	-2.00	250.00	1.20	63.40	120.00	250.00	0	N/A	41.29
8-3.286	8	24	Ramp 4- Kansas Ave- EB 360	09+04.47	40	40	0	S	300.00	-3.30	-1.10	136.00	2.20	63.40	120.00	136.36	0	N/A	75.70
8-3.286	9	25	ML Curve 20	81+77.50	70	70	0	S	1000.00	-1.06	0.90	510.00	1.96	180.30	210.00	510.20	0	N/A	206.54
8-3.286	14	30	Ramp 1- Campbell Ave-WB 60	04+68.33	40	40	0	C	500.00	1.46	-1.50	169.00	2.96	43.10	120.00	168.92	305	614.53	0.00
8-3.286	14	30	Ramp 1- Campbell Ave-WB 60	13+00.00	40	40	0	S	300.00	-1.50	0.68	150.00	2.18	63.40	120.00	137.49	0	N/A	75.08
8-3.286	14	30	Ramp 2- EB 60-Campbell Ave	06+64.00	40	40	0	C	400.00	-0.12	-3.50	118.00	3.38	43.10	120.00	118.34	305	519.23	0.00
8-3.286	14	30	Ramp 2- EB 60-Campbell Ave	12+72.50	25	25	0	S	300.00	-3.50	0.00	85.70	3.50	25.50	75.00	85.71	0	N/A	47.04
8-3.286	13	29	ML Curve 21	126+00.00	70	70	0	C	1400.00	0.90	-2.10	467.00	3.00	246.90	210.00	466.67	730	1003.53	0.00
8-3.286	14	30	Ramp 3- WB 360-Campbell Ave	02+25.00	25	25	0	S	300.00	-0.55	2.50	98.40	3.05	25.50	75.00	98.36	0	N/A	40.99
8-3.286	14	30	Ramp 3- WB 360-Campbell Ave	07+00.74	40	40	0	C	600.00	2.50	-1.50	150.00	4.00	43.10	120.00	150.00	305	568.95	0.00
8-3.286	14	30	Ramp 4- Campbell Ave- EB 360	00+32.63	40	40	0	S	280.00	0.00	2.80	100.00	2.80	63.40	120.00	100.00	0	N/A	96.34
8-3.286	14	30	Ramp 4- Campbell Ave- EB 360	10+20.05	40	40	0	C	600.00	2.80	-1.50	140.00	4.30	43.10	120.00	139.53	305	548.74	0.00
9-3.288	9	21	ML Curve 22	148+00.00	70	70	0	S	500.00	-2.10	0.00	238.00	2.10	180.30	210.00	238.10	0	N/A	221.29
10-3.352	6	24	ML Curve 23	173+34.94	70	70	0	S	900.00	0.00	1.54	584.00	1.54	180.30	210.00	584.42	0	N/A	162.28
10-3.352	7	31	Ramp 1- National Ave-WB 60	05+82.98	40	40	0	S	500.00	-0.40	4.50	102.00	4.90	63.40	120.00	102.04	0	N/A	168.60
10-3.352	7	31	Ramp 1- National Ave-WB 60	13+00.00	40	40	0	C	300.00	4.50	1.00	86.00	3.50	43.10	120.00	85.71	305	458.29	0.00
10-3.352	7	31	Ramp 2- EB 60-National Ave	06+28.79	40	40	0	S	580.00	-0.50	5.00	106.00	5.50	63.40	120.00	105.45	0	N/A	189.25
10-3.352	7	31	Ramp 2- EB 60-National Ave	12+89.50	25	25	0	C	300.00	5.00	1.00	75.00	4.00	11.10	75.00	75.00	155	419.75	0.00

J8P3032 JAMES RIVER FREEWAY (360/60) VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics				Vertical Design Criteria							
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
10-3.352	7	31	Ramp 3- WB 60-National Ave	03+00.00	25	25	0	C	150.00	-1.00	-2.00	150.00	1.00	11.10	75.00	150.00	155	1154.00	0.00
10-3.352	7	31	Ramp 3- WB 60-National Ave	08+06.27	40	40	0	S	380.00	-2.00	2.00	95.00	4.00	63.40	120.00	95.00	0	N/A	137.63
10-3.352	7	31	Ramp 4- National Ave-EB 60	02+00.00	40	40	0	C	200.00	-1.00	-2.40	143.00	1.40	43.10	120.00	142.86	305	870.71	0.00
10-3.352	7	31	Ramp 4- National Ave-EB 61	08+30.45	40	40	0	S	450.00	-2.40	3.00	83.00	5.40	63.40	120.00	83.33	0	N/A	185.81
13-3.297	8	19	ML Curve 24	21+94.14	70	70	0	C	800.00	1.54	-1.50	263.00	3.04	246.90	210.00	263.16	730	753.59	0.00
13-3.297	11	22	Ramp 1- Bus 60-WB 360	05+08.10	40	35	5	S	410.00	-1.73	5.00	61.00	6.73	63.40	120.00	60.92	0	N/A	231.57
13-3.297	11	22	Ramp 1- Bus 60-WB 360	12+00.00	40	40	0	C	300.00	5.00	1.00	75.00	4.00	43.10	120.00	75.00	305	419.75	0.00
13-3.297	11	22	Ramp 3- WB 360-Bus 60	02+00.00	40	40	0	C	200.00	-1.00	-1.93	215.00	0.93	43.10	120.00	215.05	305	1260.22	0.00
13-3.297	11	22	Ramp 3- WB 360-Bus 60	08+12.71	40	40	0	S	300.00	-1.93	1.60	85.00	3.53	63.40	120.00	84.99	0	N/A	121.46
13-3.297	11	22	Ramp 4- Bus 60-EB 360	01+70.01	40	30	10	C	100.00	-1.00	-2.85	54.00	1.85	43.10	120.00	54.05	305	633.24	0.00
13-3.297	11	22	Ramp 4- Bus 60-EB 360	06+00.00	40	35	5	S	330.00	-2.85	2.73	59.00	5.58	63.40	120.00	59.14	0	N/A	192.00
13-3.297	10	21	ML Curve 25	249+71.21	70	70	0	S	600.00	-1.50	1.79	182.00	3.29	180.30	210.00	182.37	0	N/A	346.69
14-CD10753	14	34	Ramp 2- EB 60-Republic Rd	05+00.00	40	40	0	C	600.00	-2.25	-4.00	343.00	1.75	43.10	120.00	342.86	305	916.57	0.00
14-CD10753	14	34	Ramp 2- EB 60-Republic Rd	13+15.00	25	25	0	S	300.00	-4.00	1.50	55.00	5.50	25.50	75.00	54.55	0	N/A	73.92
14-CD10753	14	34	Ramp 5- Republic Rd-EB 60	02+30.00	40	35	5	S	300.00	-1.50	4.25	52.00	5.75	63.40	120.00	52.17	0	N/A	197.85
14-CD10753	14	34	Ramp 5- Republic Rd-EB 60	06+00.00	40	40	0	C	432.00	4.25	1.11	140.00	3.14	43.10	120.00	137.58	305	559.63	0.00
15-CD10233	7	65	WB ML Curve 3	174+75.00	70	60	10	C	500.00	-2.12	-5.42	152.00	3.30	246.90	210.00	151.56	730	577.07	0.00
15-CD10233	7	65	WB ML Curve 4	181+25.00	70	70	0	C	300.00	-5.42	-6.08	457.00	0.66	246.90	210.00	456.62	730	1792.31	0.00
15-CD10233	9	67	ML Curve 26	189+00.00	70	60	10	S	750.00	-6.05	-0.72	141.00	5.33	180.30	210.00	140.82	0	N/A	561.23
15-CD10233	14	72	ML Curve 27	196+75.00	70	65	5	C	650.00	-0.72	-3.89	205.00	3.17	246.90	210.00	205.18	730	665.59	0.00
15-CD10233	15	73	WB ML Curve 5	205+25.00	70	70	0	S	700.00	-3.89	-0.27	193.00	3.62	180.30	210.00	193.16	0	N/A	381.88
15-CD10233	15	73	EB ML Curve 3	204+75.00	70	60	10	S	550.00	-4.50	-0.59	141.00	3.91	180.30	210.00	140.59	0	N/A	412.23
15-CD10233	16	74	US65 Ramp W-S	109+75.00	20	20	0	S	300.00	-1.95	-1.26	436.00	0.69	16.50	60.00	436.05	0	N/A	5.92
15-CD10233	16	74	US65 Ramp W-S	118+00.00	20	20	0	C	400.00	-1.26	-4.96	108.00	3.70	6.10	60.00	108.25	115	492.02	0.00
15-CD10233	16	74	US65 Ramp W-S	124+75.00	20	20	0	S	600.00	-4.96	0.76	105.00	5.72	16.50	60.00	104.95	0	N/A	49.18
15-CD10233	17	75	US65 Ramp W-N	206+25.00	45	45	0	S	500.00	-0.06	4.98	99.00	5.03	78.10	135.00	99.32	0	N/A	219.22
15-CD10233	17	75	US65 Ramp W-N	218+00.00	45	45	0	C	850.00	4.98	-4.93	86.00	9.91	60.10	135.00	85.75	360	430.18	0.00
15-CD10233	23	81	US65 Ramp W-N	229+50.00	45	45	0	S	650.00	-4.93	1.50	101.00	6.44	78.10	135.00	100.96	0	N/A	280.36
15-CD10233	18	76	US65 Ramp S-W	326+00.00	40	40	0	C	1100.00	4.77	-4.17	123.00	8.94	43.10	120.00	123.01	305	515.23	0.00
15-CD10233	18	76	US65 Ramp S-W	336+75.00	40	40	0	S	650.00	-4.17	1.92	107.00	6.09	63.40	120.00	106.77	0	N/A	209.48

J8P3032 JAMES RIVER FREEWAY (360/60) VERTICAL GEOMETRICS

[illegible]

J8P3032 : JAMES RIVER FREEWAY (360/60) ACCELERATION & DECELERATION GEOMETRICS

Corridor Information							Ramp Geometrics					Ramp Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	ML Speed (MPH)	Operational Ramp Speed (MPH)	Acceleration/Deceleration	Parallel (P) or Taper (T) Ramp Type	Measured Length	Ramp Radius	Ramp Superelevation	Average Grade %	Flat Grade Length	Grade Factor	Required L
CD-3690	4	29	Ramp 1- WB 360-WB 44	70	40	Acceleration	Parallel	836.61	984.25	6.6%	-2.00	1000	1.00	1000.00
CD-3690	4	29	Ramp 2- EB 44-EB 360	70	40	Deceleration	Parallel	836.61	1148.29	7.6%	2.00	440	1.00	440.00
CD-3690	4	32	Ramp 3- WB 44-EB 360 Loop Ramp	70	35	Deceleration	Parallel	492.13	426.51	8.0%	1.00	490	1.00	490.00
CD-3690	4	33	Ramp 4- WB 360-EB 44	70	40	Acceleration	Parallel	590.55	1148.29	7.6%	0.56	1000	1.00	1000.00
Current Project			Ramp 1- MM-WB 360	70	40	Acceleration	Parallel	579.70	1492.78	5.8%	0.37	1000	1.00	1000.00
CD-3690	14	37	Ramp 2- EB 360-MM	70	40	Deceleration	Parallel	360.89	967.85	7.6%	-0.37	440	1.00	440.00
CD-3690	14	39	Ramp 3- WB 360-MM	70	30	Deceleration	Parallel	360.89	967.85	7.6%	-2.56	520	1.00	520.00
Current Project			Ramp 4- MM-EB 360	70	30	Acceleration	Parallel	665.70	1492.78	5.8%	2.56	1350	1.00	1350.00
Current Project			Ramp 1- Sunshine-WB 360	70	40	Acceleration	Parallel	579.70	967.85	7.6%	-0.90	1000	1.00	1000.00
CD-3690	25	49	Ramp 2- EB 360-Sunshine	70	40	Deceleration	Parallel	360.89	1279.53	6.6%	-0.90	440	1.00	440.00
6-3.331	3	13	Ramp 3- WB 360-Sunshine	70	35	Deceleration	Parallel	800.00	2291.83	3.0%	1.70	490	1.00	490.00
Current Project			Ramp 4- Sunshine-EB 360	70	20	Acceleration	Parallel	820.00	954.93	2.4%	-1.70	1520	1.00	1520.00
Current Project			Ramp 1- FF-WB 60	70	25	Acceleration	Parallel	550.00	954.93	4.0%	-1.00	1420	1.00	1420.00
6-3.331	9	19	Ramp 2- EB 60-FF	70	25	Deceleration	Parallel	40.00	954.93	4.0%	1.00	550	1.00	550.00
6-3.331	9	19	Ramp 3- WB 60-FF	70	35	Deceleration	Parallel	400.00	954.93	8.0%	-2.00	490	1.00	490.00
Current Project			Ramp 4- FF-EB 60	70	35	Acceleration	Parallel	580.00	954.93	8.0%	2.00	1230	1.00	1230.00
Current Project			Ramp 1- Kansas Ave-WB 60	70	40	Acceleration	Parallel	550.00	1909.86	4.0%	0.40	1000	1.00	1000.00
6-3.331	15	27	Ramp 2- EB 60-Kansas Ave	70	40	Deceleration	Parallel	350.00	1909.86	4.0%	-0.40	440	1.00	440.00
8-3.286	5	21	Ramp 3- WB 60-Kansas Ave	70	40	Deceleration	Parallel	NA	1909.86	5.0%	1.00	440	1.00	440.00
8-3.286	5	21	Ramp 4- Kansas Ave- EB 60	70	40	Acceleration	Parallel	NA	1909.86	5.0%	-1.00	1000	1.00	1000.00
8-3.286	12	28	Ramp 1- Campbell Ave-WB 60	70	35	Acceleration	Parallel	NA	1145.92	5.0%	-0.90%	1230	1.00	1230.00
8-3.286	12	28	Ramp 2- EB 60-Campbell Ave	70	35	Deceleration	Parallel	NA	1145.95	5.0%	-0.90%	490	1.00	490.00
8-3.286	12	28	Ramp 3- WB 60-Campbell Ave	70	25	Deceleration	Parallel	NA	1109.86	3.0%	2.10%	550	1.00	550.00
8-3.286	12	28	Ramp 4- Campbell Ave- EB 60	70	35	Acceleration	Parallel	NA	1145.92	5.0%	-2.10%	1230	1.00	1230.00

J8P3032 : JAMES RIVER FREEWAY (360/60) ACCELERATION & DECELERATION GEOMETRICS

Corridor Information							Ramp Geometrics					Ramp Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	ML Speed (MPH)	Operational Ramp Speed (MPH)	Acceleration/Deceleration	Parallel (P) or Taper (T) Ramp Type	Measured Length	Ramp Radius	Ramp Superelevation	Average Grade %	Flat Grade Length	Grade Factor	Required L
10-3.352	5	23	Ramp 1- National Ave-WB 60	70	30	Acceleration	Parallel	NA	1909.86	3.0%	0.00%	1350	1.00	1350.00
10-3.352	5	23	Ramp 2- EB 60-National Ave	70	40	Deceleration	Parallel	NA	2546.48	3.0%	0.00%	440	1.00	440.00
10-3.352	5	23,8	Ramp 3- WB 60-National Ave	70	35	Deceleration	Parallel	2800.00	3274.04	2.0%	-1.54%	490	1.00	490.00
10-3.352	5	23,8	Ramp 4- National Ave-EB 61	70	40	Acceleration	Parallel	2600.00	1145.95	6.0%	1.54%	1000	1.00	1000.00
14-CD10753	3	23,3	Ramp 2- EB 60-Republic Rd	70	40	Deceleration	Parallel	400.00	1432.39	6.4%	-1.60%	440	1.00	440.00
14-CD10753	4	24,3	Ramp 5- Republic Rd-EB 60	70	15	Acceleration	Parallel	450.00	954.93	8.0%	2.00%	1560	1.00	1560.00
13-3.297	5	20	Ramp 1- Bus 60-WB 360	70	30	Acceleration	Parallel	400.00	1432.39	4.0%	0.00%	1350	1.00	1350.00
13-3.297	5	20	Ramp 3- WB 360-Bus 60	70	40	Deceleration	Parallel	NA	1637.02	4.0%	-1.54%	440	1.00	440.00
13-3.297	5	20	Ramp 4- Bus 60-EB 360	70	35	Acceleration	Parallel	NA	954.93	7.0%	1.54%	1230	1.00	1230.00
15-CD10233	13	71	65 Ramp N-W	70	40	Acceleration	Parallel	800.00	806.00	7.6%	2.25%	1000	1.00	1000.00
15-CD10233	13	71	65 Ramp N-E	70	15	Acceleration	Parallel	300.00	430.00	-2.0%	-0.60%	1560	1.00	1560.00
15-CD10233	13	71	65 Ramp S-W	70	45	Acceleration	Parallel	NA	1930.00	4.6%		820	1.00	820.00
15-CD10233	25	83	65 Ramp S-E	70	40	Acceleration	Parallel	380.00	1000.00	7.6%		1000	1.00	1000.00
15-CD10233	13	71	65 Ramp W-N	70	50	Deceleration	Parallel	850.00	2000.00	5.2%		340	1.00	340.00
15-CD10233	13	71	65 Ramp E-S	70	15	Deceleration	Parallel	350.00	430.00	5.6%	0.27%	590	1.00	590.00
					Does not meet design criteria									
					Current Ramp extension project									

US 60 East Corridor
Roadway Tables

J8P0683G & JGP0683E: US-60 EAST FREEWAY HORIZONTAL GEOMETRICS

[illegible]

J8P0683G & JGP0683E: US-60 EAST FREEWAY VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics				Vertical Design Criteria							
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
1-3.190	3	14	Ramp 2 WB60-NB65	04+68.90	40	40	0	S	600	-0.80	3.00	157.89	3.8	63.4	120	157.9	305	N/A	131
1-3.190	3	14	Ramp 4 NB65-EB60	13+69.60	40	40	0	S	188.8	0.00	1.40	134.86	1.4	63.4	120	134.9	305	N/A	48
1-3.190	3	14	EB ML Curve 1	224+76.70	60	60	0	S	300	0.00	1.50	200.00	1.5	135.7	180	200.0	570	N/A	116
1-3.190	3	14	EB ML Curve 2	234+75.00	60	45	15	S	500	1.50	7.00	90.91	5.5	135.7	180	90.9	570	N/A	426
1-3.190	4	16	EB ML Curve 3	241+03.80	60	30	30	S	100	7.00	7.30	333.33	0.3	135.7	180	333.3	570	N/A	23
1-3.190	4	16	EB ML Curve 4	244+03.80	60	30	30	C	100	7.30	6.72	172.41	0.58	150.6	180	172.4	570	1910	0
1-3.190	4	16	EB ML Curve 5	258+60.00	60	55	5	C	1080	6.72	-2.00	123.85	8.72	150.6	180	123.9	570	517	0
1-3.190	5	18	EB ML Curve 6	274+49.40	60	55	5	S	400	-2.00	1.26	122.70	3.26	135.7	180	122.7	570	N/A	252
1-3.190	6	20	EB ML Curve 7	299+75.60	60	60	0	C	600	1.26	0.40	697.67	0.86	150.6	180	697.7	570	1555	0
5-8P0683D	9	75	WB ML Curve 1	319+50.00	60	60	0	C	600	3.34	-0.62	151.52	3.96	150.6	180	151.5	570	572	0
5-8P0683D	9	75	WB ML Curve 2	324+00.00	80	80	0	S	300	-0.62	0.44	283.02	1.06	231	240	283.0	910	N/A	146
5-8P0683D	9	75	WB ML Curve 3	328+00.00	80	80	0	C	400	0.44	-0.40	476.19	0.84	383.7	240	476.2	910	1485	0
1-3.190	7	22	EB ML Curve 8	328+00.00	60	60	0	C	400	0.40	-0.40	500.00	0.8	150.6	180	500.0	570	1549	0
5-8P0683D	11	77	Ramp 1 NN-WB60 Curve 1A	01+00.00	30	25	5	C	80	-0.40	-0.80	200.00	0.4	18.5	90	200.0	200	2738	0
5-8P0683D	11	77	Ramp 1 NN-WB60 Curve 1B	03+00.00	30	30	0	S	280	-0.80	6.39	38.94	7.19	36.4	90	38.9	200	N/A	139
5-8P0683D	11	77	Ramp 1 NN-WB60 Curve 1C	06+30.00	30	30	0	C	100	6.39	2.00	22.78	4.39	18.5	90	22.8	200	296	0
5-8P0683D	11	77	Ramp 2 EB60-NN Curve 2A	00+80.00	40	30	10	C	100	-0.40	-1.02	161.29	0.62	43.1	120	161.3	305	1790	0
5-8P0683D	11	77	Ramp 2 EB60-NN Curve 2B	03+30.00	40	40	0	S	320	-1.02	3.72	67.51	4.74	63.4	120	67.5	305	N/A	163
5-8P0683D	11	77	Ramp 2 EB60-NN Curve 2C	08+00.00	25	25	0	C	120	3.72	1.29	49.38	2.43	11.1	75	49.4	155	504	0
5-8P0683D	11	77	Ramp 3 WB60-NN Curve 3A	01+00.00	25	25	0	C	100	0.60	-4.10	21.28	4.7	11.1	75	21.3	155	280	0
5-8P0683D	11	77	Ramp 3 WB60-NN Curve 3B	07+90.00	45	45	0	S	380	-4.10	0.51	82.43	4.61	78.1	135	82.4	360	N/A	201
5-8P0683D	11	77	Ramp 4 NN-EB60 Curve 4A	00+80.00	40	30	10	C	100	-2.58	-5.72	31.85	3.14	43.1	120	31.8	305	394	0
5-8P0683D	11	77	Ramp 4 NN-EB60 Curve 4B	04+40.00	40	40	0	S	400	-5.72	0.29	66.56	6.01	63.4	120	66.6	305	N/A	207
4-3.026		5	WB ML Curve 4	209+50.00	60		60	S	400	-5.00	1.20	64.52	6.2	135.7	180	64.5	570	N/A	480
4-3.026		5	WB ML Curve 5	213+50.00	60	55	5	C	200	1.20	-0.46	120.48	1.66	150.6	180	120.5	570	750	0
4-3.026		5	WB ML Curve 6	216+50.00	60	30	30	S	200	-0.46	4.29	42.11	4.75	135.7	180	42.1	570	N/A	368
4-3.026		5	WB ML Curve 7	221+00.00	60	45	15	C	600	4.29	-5.50	61.29	9.79	150.6	180	61.3	570	364	0

J8P0683G & JGP0683E: US-60 EAST FREEWAY VERTICAL GEOMETRICS

Corridor Information										Vertical Geometrics				Vertical Design Criteria					
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
4-3.026		5	WB ML Curve 8	225+50.00	60	25	35	S	200	-5.50	0.00	36.36	5.5	135.7	180	36.4	570	N/A	426
4-3.026		5	WB ML Curve 9	229+73.00	60	30	30	S	200	0.00	4.93	40.55	4.93	135.7	180	40.6	570	N/A	382
4-3.026		5	WB ML Curve 10	234+75.00	60	55	5	C	600	4.93	0.70	141.71	4.23	150.6	180	141.7	570	553	0
4-3.026		6	WB ML Curve 11	239+00.00	60	60	0	S	200	0.70	0.92	900.90	0.22	135.7	180	900.9	570	N/A	17
4-3.026		6	WB ML Curve 12	242+20.00	60	45	15	C	250	0.92	-2.30	77.64	3.22	150.6	180	77.6	570	460	0
4-3.026		6	WB ML Curve 13	245+00.00	60	45	15	S	200	-2.30	0.00	86.96	2.3	135.7	180	87.0	570	N/A	178
4-3.026		6	WB ML Curve 14	251+00.00	60	50	10	C	300	0.00	-2.79	107.53	2.79	150.6	180	107.5	570	537	0
4-3.026		6	WB ML Curve 15	254+00.00	60	55	5	S	400	-2.79	0.39	125.79	3.18	135.7	180	125.8	570	N/A	246
4-3.026		6	WB ML Curve 16	261+00.00	60	60	0	S	200	0.39	1.77	145.35	1.38	135.7	180	145.3	570	N/A	107
4-3.026		7	WB ML Curve 17	269+50.00	60	55	5	C	350	1.77	-0.78	137.69	2.54	150.6	180	137.7	570	599	0
4-3.026		7	WB ML Curve 18	273+75.00	60	45	15	S	300	-0.77	2.89	82.06	3.66	135.7	180	82.1	570	N/A	283
4-3.026		7	WB ML Curve 19	277+35.00	60	60	0	C	400	2.89	1.00	211.64	1.89	150.6	180	211.6	570	771	0
4-3.026		7	WB ML Curve 20	282+35.00	60	60	0	C	350	1.00	0.35	536.81	0.65	150.6	180	536.8	570	1830	0
4-3.026		7	WB ML Curve 21	288+00.00	60	50	10	S	200	0.35	2.30	102.46	1.95	135.7	180	102.5	570	N/A	151
4-3.026		7	WB ML Curve 22	293+00.00	60	45	15	C	350	2.30	-2.30	76.09	4.6	150.6	180	76.1	570	410	0
4-3.026		7	WB ML Curve 23	297+78.00	60	40	20	S	450	-2.30	4.31	68.08	6.61	135.7	180	68.1	570	N/A	512
4-3.026		8	WB ML Curve 24	302+60.00	60	45	15	C	480	4.31	-3.28	63.24	7.59	150.6	180	63.2	570	369	0
4-3.026		8	WB ML Curve 25	306+00.00	60	35	25	S	200	-3.28	0.24	56.82	3.52	135.7	180	56.8	570	N/A	273
4-3.026		8	WB ML Curve 26	311+00.00	60	35	25	S	300	0.24	5.60	55.97	5.36	135.7	180	56.0	570	N/A	415
4-3.026		8	WB ML Curve 27	314+25.00	60	60	0	C	300	5.60	4.18	211.27	1.42	150.6	180	211.3	570	910	0
4-3.026		8	WB ML Curve 28	323+00.00	60	50	10	C	550	4.18	-1.73	93.14	5.91	150.6	180	93.1	570	448	0
4-3.026		8	WB ML Curve 29	327+00.00	60	55	5	S	250	-1.73	0.33	121.54	2.06	135.7	180	121.5	570	N/A	159
4-3.026		9	WB ML Curve 30	330+75.00	60	60	0	S	200	0.33	0.85	384.62	0.52	135.7	180	384.6	570	N/A	40
4-3.026		9	WB ML Curve 31	333+75.00	60	55	5	C	350	0.85	-1.50	148.94	2.35	150.6	180	148.9	570	634	0
4-3.026		9	WB ML Curve 32	336+75.00	60	60	0	S	250	-1.50	0.20	147.06	1.7	135.7	180	147.1	570	N/A	132
4-3.026		9	WB ML Curve 33	342+75.00	60	55	5	S	250	0.20	2.24	122.37	2.04	135.7	180	122.4	570	N/A	158
4-3.026		9	WB ML Curve 34	346+00.00	60	60	0	C	300	2.24	0.80	207.90	1.44	150.6	180	207.9	570	898	0
4-3.026		9	WB ML Curve 35	350+00.00	60	55	5	C	400	0.80	-1.99	143.52	2.79	150.6	180	143.5	570	587	0
4-3.026		10	WB ML Curve 36	354+00.00	60	45	15	S	200	-1.99	0.20	91.45	2.19	135.7	180	91.4	570	N/A	169
4-3.026		10	WB ML Curve 37	362+00.00	60	45	15	S	200	0.20	2.49	87.34	2.29	135.7	180	87.3	570	N/A	177

J8P0683G & JGP0683E: US-60 EAST FREEWAY VERTICAL GEOMETRICS

Corridor Information										Vertical Geometrics				Vertical Design Criteria						
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length	
4-3.026		10	WB ML Curve 38	364+75.00	60	60	0	C	350	2.49	0.79	205.76	1.7	150.6	180	205.8	570	809	0	
4-3.026		10	WB ML Curve 39	374+00.00	60	55	5	C	300	0.79	-1.30	143.61	2.09	150.6	180	143.6	570	667	0	
4-3.026		10	WB ML Curve 40	377+00.00	60	60	0	S	200	-1.30	0.00	153.85	1.3	135.7	180	153.8	570	N/A	101	
4-3.026		10	WB ML Curve 41	381+50.00	60	60	0	S	500	0.00	3.19	156.99	3.19	135.7	180	157.0	570	N/A	247	
4-3.026		10	WB ML Curve 42	387+50.00	60	55	5	S	300	3.19	0.59	115.38	2.6	135.7	180	115.4	570	N/A	201	
4-3.026		11	WB ML Curve 43	397+75.00	60	45	15	C	300	0.61	-3.04	82.06	3.66	150.6	180	82.1	570	445	0	
4-3.026		11	WB ML Curve 44	401+50.00	60	35	25	S	200	-3.04	0.56	55.57	3.6	135.7	180	55.6	570	N/A	279	
4-3.026		11	WB ML Curve 45	406+00.00	60	30	30	S	200	0.56	-4.56	39.09	5.12	135.7	180	39.1	570	N/A	396	
4-3.026		11	WB ML Curve 46	409+75.00	60	45	15	C	400	-4.56	0.25	83.16	4.81	150.6	180	83.2	570	424	0	
4-3.026		11	WB ML Curve 47	414+00.00	60	60	0	S	200	0.25	1.65	142.86	1.4	135.7	180	142.9	570	N/A	108	
4-3.026		12	WB ML Curve 48	418+00.00	60	45	15	C	350	1.65	-3.40	69.31	5.05	150.6	180	69.3	570	389	0	
4-3.026		12	WB ML Curve 49	420+25.00	60	50	10	S	150	-3.40	0.00	44.12	3.4	135.7	180	44.1	570	N/A	263	
4-3.026		12	WB ML Curve 50	426+00.00	60	60	0	S	200	0.00	1.11	180.18	1.11	135.7	180	180.2	570	N/A	86	
4-3.026		12	WB ML Curve 51	432+75.00	60	55	5	C	300	1.11	-1.50	114.94	2.61	150.6	180	114.9	570	563	0	
4-3.026		12	WB ML Curve 52	436+75.00	60		60	S	200	-1.50		133.33	1.5	135.7	180	133.3	570	N/A	116	
4-3.026		12	WB ML Curve 53	439+50.00	60		60	C	300		-0.34	882.35	0.34	150.6	180	882.4	570	3324	0	
5-8P0683D	9	75	WB ML Curve 54	353+50.00	80	80	0	S	400	-0.40	0.70	363.64	1.1	231	240	363.6	910	N/A	151	
1-3.190	7	22	EB ML Curve 9	353+50.00	60	60	0	S	400	-0.40	0.70	363.64	1.1	135.7	180	363.6	570	N/A	85	
5-8P0683D	9	75	WB ML Curve 55	361+10.00	60	60	0	S	300	0.70	2.72	148.51	2.02	135.7	180	148.5	570	N/A	156	
5-8P0683D	9	75	WB ML Curve 56	368+80.00	60	60	0	C	880	2.72	-2.85	157.99	5.57	150.6	180	158.0	570	584	0	
1-3.190	9	26	EB ML Curve 10	414+50.00	60	60	0	C	400	0.70	-0.94	243.90	1.64	150.6	180	243.9	570	858	0	
1-3.190	10	28	EB ML Curve 11	440+00.00	60	60	0	S	400	-0.94	-0.40	740.74	0.54	135.7	180	740.7	570	N/A	42	
1-3.190	11	30	EB ML Curve 12	454+15.00	60	60	0	S	600	-0.40	1.10	400.00	1.5	135.7	180	400.0	570	N/A	116	
1-3.190	11	30	EB ML Curve 13	470+00.00	60	60	0	C	800	1.10	-0.80	421.05	1.9	150.6	180	421.1	570	968	0	
1-3.190	12	32	EB ML Curve 14	485+00.00	60	60	0	S	800	-0.80	1.16	408.16	1.96	135.7	180	408.2	570	N/A	152	
1-3.190	13	33	EB ML Curve 15	512+50.00	60	60	0	C	400	1.16	0.64	769.23	0.52	150.6	180	769.2	570	2275	0	
1-3.190	13	33	EB ML Curve 16	533+70.70	60	60	0	S	600	0.64	1.80	517.24	1.16	135.7	180	517.2	570	N/A	90	
1-3.190	14	36	EB ML Curve 17	551+25.00	60	60	0	C	1200	1.80	-0.40	545.45	2.2	150.6	180	545.5	570	1085	0	
1-3.190	15	38	EB ML Curve 18	566+00.00	60	60	0	S	600	-0.40	1.00	428.57	1.4	135.7	180	428.6	570	N/A	108	
1-3.190	15	38	EB ML Curve 19	576+60.70	60	60	0	C	600	1.00	-0.40	428.57	1.4	150.6	180	428.6	570	1071	0	

J8P0683G & JGP0683E: US-60 EAST FREEWAY VERTICAL GEOMETRICS

[illegible]

J8P0683G & JGP0683E: US-60 EAST FREEWAY ACCELERATION & DECELERATION GEOMETRICS

Corridor Information							Ramp Geometrics					Ramp Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	ML Speed (MPH)	Operational Ramp Speed (MPH)	Acceleration/Deceleration	Parallel (P) or Taper (T) Ramp Type	Measured Length	Ramp Radius	Ramp Superelevation	Average Grade %	Flat Grade Length	Grade Factor	Required L
5-8P0683D	5	72	Ramp 1 NN-WB60	60	25	Acceleration	Parallel	800.00	1550.00	2.0%	0.40%	1020	1.00	1020.00
5-8P0683D	5	72	Ramp 2 EB60-NN	60	20	Deceleration	Parallel	350.00	1500.00	2.0%	-0.40%	480	1.00	480.00
5-8P0683D	5	72	Ramp 3 WB60-NN	60	25	Deceleration	Parallel	375.00	1014.00	2.0%	-0.70%	460	1.00	460.00
5-8P0683D	5	72	Ramp 4 NN-EB60	60	20	Acceleration	Parallel	550.00	1500.00	2.0%	0.70%	1100	1.00	1100.00
						Does not meet design criteria								

**I-44 Corridor
Roadway Tables**

J8I3044: I-44 FREEWAY HORIZONTAL GEOMETRICS

Corridor Information									Horizontal Geometrics			Horizontal Design Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
1-3.176	8	38	Ramp A- WB 44-County Road MM	01+35.70	70.36	40	20	20	270.73	1273.57	2.0%	600	3970	2.0%
1-3.176	8	38	Ramp B- County Road MM-WB 44	07+70.10	70.09	40	40	0	255.56	1273.57	6.0%	600	965	6.0%
1-3.176	8	38	Ramp C- EB 44-County Road MM	01+25.30	70.05	40	20	20	250.00	1432.69	2.0%	600	3970	2.0%
1-3.176	8	38	Ramp D- County Road MM-EB 44	06+82.50	70.33	40	40	0	260.00	1146.28	6.0%	600	965	6.0%
1-3.176	13	45	ML- Curve 1	640+55.70	72.03 RT	70	70	0	2710.70	4583.75	5.0%	2100	3910	5.0%
1-3.176	22	65	Old Ramp 1- EB 44-Rte 266	01+96.54	72.36	30	30	0	387.50	955.37	6.0%	450	506	6.0%
2.5-CD 120329	8	30	Ramp 2-1- EB 44-Rte 266	01+31.19	72.51	25	15	10	250.22	337.03	-2.0%	375	0	-2.0%
2.5-CD 120329	7	29	Ramp 4- Rte 266-WB 44	00+64.98	72.48	25	15	10	128.10	310.00	2.0%	375	1720	2.0%
1-3.176	22	65	Old Ramp 4- Rte 266-WB 44	08+42.18	72.48	25	15	10	383.97	550.00	2.0%	375	1720	2.0%
1-3.176	22	65	Old Ramp 4- Rte 266-WB 44	13+31.42	72.63	25	15	10	460.77	275.00	2.0%	375	1720	2.0%
1-3.176	22	65	Old Ramp 4- Rte 266-WB 44	16+30.04	72.63	25	25	0	277.91	465.10	6.0%	375	332	6.0%
1-3.176	22	65	Old Ramp 5- WB 44-Rte 266	03+32.45	72.68	40	35	5	622.06	716.78	6.0%	600	965	6.0%
2.5-CD 120329	7	29	Ramp 5- WB 44-Rte 266	12+14.72		40	20	20	435.64	624.00	4.2%	600	1660	4.2%
2.5-CD 120329	7	29	Ramp 5- WB 44-Rte 266	15+95.21		25	15	10	149.53	511.50	2.0%	375	1720	2.0%
1-3.176	22	65	Old Ramp 7- Rte 266-EB 44	06+98.20	72.68	40	35	5	241.10	716.78	6.0%	600	965	6.0%
5-3.174B	4	15	Ramp 4- Rte 744-WB 44 Curve 4A	10+27.70	74.90	40	40	0	488.50	716.78	8.0%	600	444	8.0%
5.5-3.247	27	44	Ramp 1- Route 160-WB 44	01+49.11	75.34	40	40	0	295.83	954.93	8.0%	600	444	8.0%
5.5-3.247	27	44	Ramp 2- EB 44-Route 160	01+95.87	75.37	40	40	0	386.39	954.93	8.0%	600	444	8.0%
5.5-3.247	27	44	Ramp 3- WB 44-Route 160	09+89.84	75.69	40	40	0	476.04	1909.86	5.0%	600	1310	5.0%
5.5-3.247	27	44	Ramp 4- Route 160-EB 44	10+56.27	75.70	40	40	0	292.38	1146.56	8.0%	600	444	8.0%
6-3.178	6	36	ML- Curve 2	848+80.80	75.96	70	65	5	2429.20	2864.93	6.0%	2100	3150	6.0%
6-3.178	22	51	Ramp A- EB 44-Route 13	01+34.22	77.59	40	35	5	266.70	955.37	6.0%	600	965	6.0%
6-3.178	22	51	Ramp B- Route 13-WB 44	07+90.70	77.60	40	35	5	279.20	955.37	6.0%	600	965	6.0%

J8I3044: I-44 FREEWAY HORIZONTAL GEOMETRICS

Corridor Information														
Horizontal Geometrics														
Horizontal Design Criteria														
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Log Mile (EB)	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Curve Length	Radius	SE	Curve Length 15 x Speed if 60 or less 30 x Speed if greater than 60	Radius	SE
6-3.178	24	53	Ramp C- WB 44-Route 13	01+59.82	77.87	40	35	5	316.70	955.37	6.0%	600	965	6.0%
6-3.178	24	53	Ramp D- Route 13-EB 44	07+37.15	77.87	40	35	5	300.00	955.37	6.0%	600	965	6.0%
7.5-CD 120808	21	67	Ramp 1- Missouri H-WB 44	06+40.47	80.26	40	25	15	294.69	467.72	6.0%	600	965	6.0%
7.5-CD 120808	21	67	Ramp 1- Missouri H-WB 44	11+96.28	80.18	40	30	10	517.40	690.00	6.0%	600	965	6.0%
7.5-CD 120808	23	69	Ramp 3- EB 44-Missouri H	02+94.67	80.27	40	30	10	556.96	689.77	6.0%	600	965	6.0%
7.5-CD 120808	23	69	Ramp 3- EB 44-Missouri H	09+26.70	80.36	25	25	0	285.09	371.00	6.0%	375	332	6.0%
8-3.157	70	55	Ramp 6- WB 44-Missouri H	02+94.70	80.55	40	30	10	556.50	690.00	6.0%	600	965	6.0%
7.5-CD 120808	25	71	Ramp 6- WB 44-Missouri H	09+62.43	80.46	25	25	0	433.88	467.72	6.0%	375	332	6.0%
7.5-CD 120808	27	73	Ramp 8- Missouri H-EB 44	09+21.38	80.55	40	25	15	312.83	467.72	6.0%	600	965	6.0%
7.5-CD 120808	27	73	Ramp 8- Missouri H-EB 44	12+75.53	80.62	40	35	5	1443.50	934.83	6.0%	600	965	6.0%
8.75-3.229	4	11	Ramp 1- Route 65 WB-NB Ramp Curve 1	04+00.60	82.67	40	40	0	758.61	954.93	8.0%	600	444	8.0%
8.75-3.229	4	11	Ramp 1- Route 65 WB-NB Ramp Curve 2	15+13.52		40	40	0	758.04	954.93	8.0%	600	444	8.0%
9-CD 120427	34	62	Ramp 2- Route 65 SB-WB Ramp Curve 1	201+19.92	82.28	45	40	5	248.90	1500.00	4.8%	675	1750	4.8%
9-CD 120427	35	63	Ramp 2- Route 65 SB-WB Ramp Curve 2	214+69.64	82.39	45	40	5	1601.48	1200.00	5.6%	675	1390	5.6%
9-CD 120427	38	66	Ramp 2- Route 65 SB-WB Ramp Curve 3	228+30.84	82.13	45	40	5	203.06	2000.00	4.2%	675	2080	4.2%
9-CD 120427	35	63	Ramp 3- Route 65 NB-WB Flyover Ramp Curve 1	313+93.26	82.47	45	35	10	1646.34	870.00	6.0%	675	1250	6.0%
8.5-3.203	5	9	Ramp 4- Route 65 WB-SB Loop Curve 1	00+74.60	82.45	25	25	0	147.70	430.00	8.0%	375	134	8.0%
8.5-3.203	5	9	Ramp 4- Route 65 WB-SB Loop Curve 2			25	25	0	869.40	215.00	8.0%	375	134	8.0%
8.5-3.203	5	9	Ramp 4- Route 65 WB-SB Loop Curve 3	10+91.70		25	25	0	147.70	430.00	8.0%	375	134	8.0%
8.75-3.229	4	11	Ramp 6- Route 65 SB-EB Loop Curve 1	00+94.12		25	25	0	185.32	430.00	8.0%	375	134	8.0%
8.75-3.229	4	11	Ramp 6- Route 65 SB-EB Loop Curve 2			25	25	0	824.06	215.00	8.0%	375	134	8.0%
8.75-3.229	4	11	Ramp 6- Route 65 SB-EB Loop Curve 3	11+03.50	82.45	25	25	0	185.32	430.00	8.0%	375	134	8.0%
9-CD 120427	35	63	Ramp 7- Route 65 NB-EB Ramp Curve 1	701+31.94		45	40	5	262.97	1300.00	5.2%	675	1560	5.2%
9-CD 120427	35	63	Ramp 7- Route 65 NB-EB Ramp Curve 2	708+99.90		45	40	5	831.53	1235.00	5.6%	675	1390	5.6%

[illegible]

J813044: I-44 FREEWAY VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics					Vertical Design Criteria						
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
1-3.176	4	33	ML Curve 1	470+00.00	70	70	0	C	1200	1.93	-0.94	418	2.87	246.90	210.00	417.83	730	949.56	0.00
1-3.176	5	34	ML Curve 2	489+00.00	70	70	0	S	400	-0.94	0.54	270	1.48	180.30	210.00	269.91	730	N/A	156.17
1-3.176	8	38	Ramp A WB44-MM Curve A1	04+00.00	40	40	0	S	300	-0.80	3.70	67	4.50	63.40	120.00	66.67	305	N/A	154.84
1-3.176	8	38	Ramp A WB44-MM Curve A2	07+75.75	40	40	0	C	150	3.70	2.00	88	1.70	43.10	120.00	88.24	305	709.71	0.00
1-3.176	8	38	Ramp B MM-WB44- Curve B1	01+23.30	40	40	0	C	200	-2.00	-4.15	93	2.15	43.10	120.00	93.02	305	601.86	0.00
1-3.176	8	38	Ramp B MM-WB44- Curve B2	05+67.50	40	40	0	S	360	-4.15	-0.80	107	3.35	63.40	120.00	107.46	305	N/A	115.27
1-3.176	8	38	Ramp C EB44-MM Curve C1	07+00.00	40	40	0	S	300	0.28	3.84	84	3.56	63.40	120.00	84.27	305	N/A	122.49
1-3.176	8	38	Ramp C EB44-MM Curve C2	09+24.20	40	40	0	C	140	3.84	2.00	76	1.84	43.10	120.00	76.09	305	656.41	0.00
1-3.176	8	38	Ramp D MM-EB44- Curve D1	01+12.53	40	40	0	C	200	-2.42	-3.98	128	1.56	43.10	120.00	128.21	305	791.67	0.00
1-3.176	8	38	Ramp D MM-EB44- Curve D2	04+50.00	40	40	0	S	400	-3.98	0.40	91	4.38	63.40	120.00	91.32	305	N/A	150.71
1-3.176	11	43	ML Curve 3	595+00.00	70	70	0	C	1200	0.54	-1.20	690	1.74	246.90	210.00	689.66	730	1220.11	0.00
1-3.176	13	45	ML Curve 4	622+00.00	70	70	0	S	1000	-1.20	0.80	500	2.00	180.30	210.00	500.00	730	N/A	210.75
1-3.176	18	57	ML Curve 5	663+60.00	70	70	0	C	1000	0.80	0.32	2083	0.48	246.90	210.00	2083.33	730	2747.92	0.00
2.5-CD 120329	14	36	Ramp 4A- WB 44-Rte 266	01+42.41	40	35	5	S	190	-0.61	2.50	61	3.11	63.40	120.00	61.09	305	N/A	107.01
2.5-CD 120329	14	36	Ramp 4- WB 44-Rte 266	13+17.49	40	40	0	C	170	0.74	0.24	340	0.50	43.10	120.00	340.00	305	2243.00	0.00
2.5-CD 120329	14	36	Ramp 4- WB 44-Rte 266	15+49.31	40	40	0	C	200	0.24	-2.50	73	2.74	43.10	120.00	72.99	305	493.80	0.00
2.5-CD 120329	14	36	Ramp 5- Rte 266-WB 44	00+87.62	25	25	0	C	150	2.50	-1.47	38	3.97	11.10	75.00	37.78	155	346.79	0.00
2.5-CD 120329	14	36	Ramp 5- Rte 266-WB 44	02+50.00	25	25	0	S	100	-1.47	-0.16	76	1.31	25.50	75.00	76.34	155	N/A	17.61
3-3.174a	3	8	ML Curve 6	691+90.02	70	70	0	S	600	0.32	2.00	357	1.68	180.30	210.00	357.14	730	N/A	177.03
3-3.174a	4	9	ML Curve 7	704+84.70	70	70	0	C	1100	2.00	-2.00	275	4.00	246.90	210.00	275.00	730	770.36	0.00
3-3.174a	4	9	ML Curve 8	714+88.10	70	70	0	S	600	-2.00	-0.30	353	1.70	180.30	210.00	352.94	730	N/A	179.14
4-3.174	5	15	ML Curve 9	752+40.00	70	70	0	C	300	-0.30	-0.60	1000	0.30	246.90	210.00	1000.00	730	3746.67	0.00
5-3.174B	3	14	ML Curve 10	786+85.60	70	70	0	S	1200	-0.60	3.00	333	3.60	180.30	210.00	333.33	730	N/A	379.35
5-3.174B	4	15	Ramp 4- Rte 744-WB 44 Curve 4A	01+00.00	25	25	0	S	150	-0.30	1.65	77	1.95	25.50	75.00	76.92	155	N/A	26.21
5-3.174B	4	15	Ramp 4- Rte 744-WB 44 Curve 4B	09+25.00	40	40	0	C	300	1.65	-0.90	118	2.55	43.10	120.00	117.65	305	573.14	0.00
5-3.174B	5	16	ML Curve 11	803+89.00	70	65	5	C	1400	3.00	-3.00	233	6.00	246.90	210.00	233.33	730	709.60	0.00
6-3.178	5	35	ML Curve 12	826+00.00	70	70	0	S	600	-3.00	-0.70	261	2.30	180.30	210.00	261.21	730	N/A	242.05
5.5-3.247	28	45	Ramp 1 Route 160-WB 44 Curve 1A	04+22.40	40	40	0	S	510	-4.70	2.00	76	6.70	63.40	120.00	76.12	305	N/A	230.54
5.5-3.247	28	45	Ramp 2 EB 44-Route 160 Curve 2A	03+94.20	40	25	15	S	420	-5.50	8.00	31	#####	63.40	120.00	31.11	305	N/A	464.52
5.5-3.247	28	45	Ramp 3 WB44-Route 160 Curve 3A	10+72.13	40	40	0	C	500	2.00	-5.00	71	7.00	43.10	120.00	71.43	305	392.61	0.00
5.5-3.247	28	45	Ramp 3 WB44-Route 160 Curve 3B	07+86.10	40	40	0	S	400	-5.00	0.33	75	5.33	63.40	120.00	75.12	305	N/A	183.23

J813044: I-44 FREEWAY VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics					Vertical Design Criteria						
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
5.5-3.247	28	45	Ramp 4 Route 160-EB 44 Curve 4A	10+54.27	25	25	0	C	260	-1.55	-6.00	58	4.45	11.10	75.00	58.43	155	372.47	0.00
5.5-3.247	28	45	Ramp 4 Route 160-EB 44 Curve 4B	07+21.70	40	35	5	S	375	-6.00	0.00	63	6.00	63.40	120.00	62.50	305	N/A	206.45
6-3.178	13	43	ML Curve 13	875+00.00	70	70	0	C	400	-0.70	-1.00	1347	0.30	246.90	210.00	1346.80	730	3833.00	0.00
6-3.178	15	44	ML Curve 14	1022+00.00	60	60	0	S	400	-1.00	0.30	308	1.30	135.70	180.00	307.69	570	N/A	100.65
6-3.178	18	47	ML Curve 15	1040+00.00	60	60	0	S	300	0.30	0.71	728	0.41	135.70	180.00	728.16	570	N/A	31.90
6-3.178	22	51	ML Curve 16	1058+00.00	60	60	0	C	300	0.71	0.34	806	0.37	150.60	180.00	806.45	570	3050.54	0.00
6-3.178	25	54	Ramp A EB 44-Route 13 Curve A1	03+50.00	40	40	0	S	300	0.44	4.50	74	4.06	63.40	120.00	73.89	305	N/A	139.70
6-3.178	25	54	Ramp A EB 44-Route 13 Curve A2	08+00.00	40	40	0	C	180	4.50	1.00	51	3.50	43.10	120.00	51.43	305	398.29	0.00
6-3.178	25	54	Ramp B Route 13-WB 44 Curve B1	01+14.70	40	40	0	C	150	-2.16	-4.26	72	2.10	43.10	120.00	71.60	305	590.04	0.00
6-3.178	25	54	Ramp B Route 13-WB 44 Curve B2	05+79.60	40	40	0	S	400	-4.26	0.42	86	4.68	63.40	120.00	85.56	305	N/A	160.86
6-3.178	25	54	Ramp C WB 44-Route 13 Curve C1	03+60.00	40	40	0	S	350	0.00	4.50	78	4.50	63.40	120.00	77.78	305	N/A	154.84
6-3.178	25	54	Ramp C WB 44-Route 13 Curve C2	07+01.40	40	40	0	C	180	4.50	1.00	51	3.50	43.10	120.00	51.43	305	398.29	0.00
6-3.178	25	54	Ramp D Route 13-EB 44 Curve D1	01+20.00	40	40	0	C	150	-2.00	-5.16	47	3.16	43.10	120.00	47.47	305	416.46	0.00
6-3.178	25	54	Ramp D Route 13-EB 44 Curve D2	02+76.00	40	15	25	S	50	-5.16	-4.88	179	0.28	63.40	120.00	178.57	305	N/A	9.63
6-3.178	25	54	Ramp D Route 13-EB 44 Curve D3	05+00.00	40	40	0	S	400	-4.88	1.00	68	5.88	63.40	120.00	68.03	305	N/A	202.32
6-3.178	24	53	ML Curve 17	1082+85.60	60	60	0	S	400	0.34	1.52	339	1.18	135.70	180.00	338.98	570	N/A	91.35
6-3.178	34	63	ML Curve 18	1111+50.00	60	60	0	C	750	1.52	-1.52	247	3.04	150.60	180.00	246.71	570	729.66	0.00
6-3.178	38	70	ML Curve 19	1134+50.00	60	60	0	S	500	-1.52	1.31	176	2.83	135.70	180.00	176.43	570	N/A	219.41
6-3.178	40	72	ML Curve 20	1153+00.00	60	60	0	C	400	1.31	1.00	1274	0.31	150.60	180.00	1273.89	570	3636.31	0.00
6-3.178	43	75	ML Curve 21	1180+23.00	60	60	0	C	800	1.00	-0.40	571	1.40	150.60	180.00	571.43	570	1170.71	0.00
7.5-CD 120808	22	68	Ramp 1 Missouri H-WB 44 Curve 1A	03+16.67	40	40	0	C	300	-1.00	-4.29	91	3.29	43.10	120.00	91.19	305	477.96	0.00
7.5-CD 120808	22	68	Ramp 1 Missouri H-WB 44 Curve 1B	06+32.74	40	40	0	S	300	-4.29	-2.79	200	1.50	63.40	120.00	200.00	305	N/A	51.61
7.5-CD 120808	22	68	Ramp 1 Missouri H-WB 44 Curve 1C	09+32.74	40	40	0	S	300	-2.79	0.23	99	3.02	63.40	120.00	99.34	305	N/A	103.91
7.5-CD 120808	24	70	Ramp 3 EB 44-Missouri H Curve 3A	06+78.33	40	30	10	S	100	1.51	2.82	76	1.31	63.40	120.00	76.34	305	N/A	45.08
7.5-CD 120808	24	70	Ramp 3 EB 44-Missouri H Curve 3B	08+78.33	40	40	0	S	300	2.82	4.28	205	1.46	63.40	120.00	205.48	305	N/A	50.24
7.5-CD 120808	24	70	Ramp 3 EB 44-Missouri H Curve 3B	12+21.38	40	40	0	C	300	4.28	1.00	91	3.28	43.10	120.00	91.46	305	478.96	0.00
7.5-CD 120808	26	72	Ramp 6 WB 44-Missouri H Curve 6A	08+78.46	40	40	0	S	300	2.07	5.37	91	3.30	63.40	120.00	90.91	305	N/A	113.55
7.5-CD 120808	26	72	Ramp 6 WB 44-Missouri H Curve 6B	12+21.48	40	40	0	C	300	5.37	2.00	89	3.37	43.10	120.00	89.02	305	470.18	0.00
7.5-CD 120808	28	74	Ramp 8 Missouri H-EB 44 Curve 8A	06+41.94	40	40	0	C	300	-1.00	-6.04	60	5.04	43.10	120.00	59.52	305	364.09	0.00
7.5-CD 120808	28	74	Ramp 8 Missouri H-EB 44 Curve 8B	09+46.69	40	35	5	S	250	-6.04	-1.92	61	4.12	63.40	120.00	60.68	305	N/A	141.76
6-3.178	46	83	ML Curve 22	1196+02.70	60	60	0	S	300	-0.40	0.30	429	0.70	135.70	180.00	428.57	570	N/A	54.19

J813044: I-44 FREEWAY VERTICAL GEOMETRICS

Corridor Information								Vertical Geometrics					Vertical Design Criteria						
As-Built Plan Number	Sheet Number	PDF Page Number	Location	Station	Posted Speed (MPH)	Operational Speed (MPH)	Speed Difference (MPH)	Type (Sag, Crest)	Curve Length	Entrance Grade %	Exit Grade %	K	Calc'd A (Abs Ent. G-Ext G)	Req K (Tbl 3-34/36 Green book)	Req Length (3*Posted Speed Limit)	Calc'd K (Plan Length/A)	Req SSD - (Tbl 3-34/36 Green Book)	Calc'd SSD	Sag Comfort Length
8.75-3.229	6	13	Ramp 1- Route 65 WB-NB Ramp Curve 1	00+85.00	40	40	0	C	170	-0.80	-2.20	121	1.40	43.10	120.00	121.43	305	855.71	0.00
8.75-3.229	6	13	Ramp 1- Route 65 WB-NB Ramp Curve 2	04+78.00	40	40	0	S	400	-2.20	0.80	133	3.00	63.40	120.00	133.33	305	N/A	103.23
8.75-3.229	6	13	Ramp 1- Route 65 WB-NB Ramp Curve 3	16+00.00	40	40	0	C	300	0.80	0.00	375	0.80	43.10	120.00	375.00	305	1498.75	0.00
8.75-3.229	6	13	Ramp 1- Route 65 WB-NB Ramp Curve 4	18+00.00	40	30	10	C	100	0.00	-0.40	250	0.40	43.10	120.00	250.00	305	2747.50	0.00
9-CD 120427	23	51	Ramp 2- Route 65 SB-WB Ramp Curve 1	203+60.00	45	40	5	S	260	0.27	4.59	60	4.32	78.10	135.00	60.19	360	N/A	188.13
9-CD 120427	23	51	Ramp 2- Route 65 SB-WB Ramp Curve 2	211+30.00	45	45	0	C	1010	4.59	-3.20	130	7.79	60.10	135.00	129.65	360	528.95	0.00
9-CD 120427	24	52	Ramp 2- Route 65 SB-WB Ramp Curve 3	221+50.00	45	40	5	S	300	-3.20	1.50	64	4.70	78.10	135.00	63.83	360	N/A	204.68
9-CD 120427	24	52	Ramp 2- Route 65 SB-WB Ramp Curve 4	226+40.00	45	45	0	C	200	1.50	-0.55	98	2.05	60.10	135.00	97.56	360	626.34	0.00
9-CD 120427	24	52	Ramp 2- Route 65 SB-WB Ramp Curve 5	227+90.00	45	30	15	S	100	-0.55	0.62	85	1.17	78.10	135.00	85.47	360	N/A	50.95
9-CD 120427	25	53	Ramp 3- Route 65 NB-WB Flyover Ramp Curve 1	302+80.00	45	40	5	S	120	3.86	4.47	197	0.61	78.10	135.00	196.72	360	N/A	26.56
9-CD 120427	25	53	Ramp 3- Route 65 NB-WB Flyover Ramp Curve 2	309+20.00	45	45	0	C	800	4.47	-3.89	96	8.36	60.10	135.00	95.69	360	454.43	0.00
8.5-3.203	7	11	Ramp 4- Route 65 WB-SB Loop Curve 1	05+53.60	25	25	0	S	400	-2.50	5.00	53	7.50	25.50	75.00	53.33	155	N/A	100.81
8.5-3.203	7	11	Ramp 4- Route 65 WB-SB Loop Curve 2	10+00.00	25	25	0	C	100	5.00	3.20	56	1.80	11.10	75.00	55.56	155	649.44	0.00
8.75-3.229	6	13	Ramp 6- Route 65 SB-EB Loop Curve 1	00+40.00	25	25	0	C	80	-1.00	-2.30	62	1.30	11.10	75.00	61.54	155	870.00	0.00
8.75-3.229	6	13	Ramp 6- Route 65 SB-EB Loop Curve 2	03+00.00	25	25	0	S	300	-2.30	-0.80	200	1.50	25.50	75.00	200.00	155	N/A	20.16
8.75-3.229	6	13	Ramp 6- Route 65 SB-EB Loop Curve 3	06+00.00	25	25	0	C	300	-0.80	-2.74	155	1.94	11.10	75.00	154.64	155	706.19	0.00
8.75-3.229	6	13	Ramp 6- Route 65 SB-EB Loop Curve 4	09+37.40	25	25	0	S	300	-2.74	1.00	80	3.74	25.50	75.00	80.21	155	N/A	50.27
8.75-3.229	6	13	Ramp 6- Route 65 SB-EB Loop Curve 5	11+59.70	25	20	5	C	70	1.00	-0.70	41	1.70	11.10	75.00	41.18	155	669.71	0.00
9-CD 120427	29	57	Ramp 7- Route 65 NB-EB Ramp Curve 1	704+20.00	45	35	10	S	340	-1.58	4.45	56	6.03	78.10	135.00	56.38	360	N/A	262.60
9-CD 120427	29	57	Ramp 7- Route 65 NB-EB Ramp Curve 2	709+30.00	45	45	0	C	600	4.45	-2.60	85	7.05	60.10	135.00	85.11	360	428.56	0.00
9-CD 120427	30	58	Ramp 7- Route 65 NB-EB Ramp Curve 3	716+50.00	45	45	0	S	290	-2.60	-0.77	158	1.83	78.10	135.00	158.47	360	N/A	79.69
9-CD 120427	30	58	Ramp 7- Route 65 NB-EB Ramp Curve 4	726+00.00	45	45	0	S	220	-0.77	0.99	125	1.76	78.10	135.00	125.00	360	N/A	76.65
8.5-3.203	8	12	Ramp 8-Route 65 EB-SB Ramp Curve 1	03+30.00	45	45	0	S	300	-2.00	0.85	105	2.85	78.10	135.00	105.26	360	N/A	124.11
8.5-3.203	8	12	Ramp 8-Route 65 EB-SB Ramp Curve 2	17+45.00	45	30	15	S	100	0.85	1.63	128	0.78	78.10	135.00	128.21	360	N/A	33.97
9-CD 120427	31	59	Ramp 9- Route 65 EB-NB Loop Curve 1	902+60.00	25	25	0	S	250	-1.37	2.98	57	4.35	25.50	75.00	57.47	155	N/A	58.47
8-3.157	9	13	ML Curve 23	1238+00.00	60	60	0	S	400	0.30	0.80	794	0.50	135.70	180.00	794.44	570	N/A	38.98
8-3.157	11	15	ML Curve 24	1264+00.00	60	60	0	C	400	0.80	-0.72	263	1.52	150.60	180.00	263.07	570	909.63	0.00
8-3.157	12	16	ML Curve 25	1286+00.00	60	60	0	S	400	-0.72	0.72	278	1.44	135.70	180.00	278.36	570	N/A	111.25
8-3.157	12	16	ML Curve 26	1306+00.00	60	60	0	C	400	0.72	-0.80	263	1.52	150.60	180.00	263.16	570	909.87	0.00
8-3.157	13	17	ML Curve 27	1326+00.00	60	60	0	S	800	-0.80	0.80	500	1.60	135.70	180.00	500.00	570	N/A	123.87
9.5-3.298	7	16	Ramp 1 WB 44-Farm Road 199 Curve 1A	04+68.00	40	40	0	S	300	0.00	4.00	75	4.00	63.40	120.00	75.00	305	N/A	137.63

J813044: I-44 FREEWAY VERTICAL GEOMETRICS

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J813044: I-44 FREEWAY ACCELERATION & DECELERATION RAMP LENGTHS

Corridor Information							Ramp Geometrics					Ramp Criteria		
As-Built Plan Number	Sheet Number	PDF Page Number	Location	ML Speed (MPH)	Operational Ramp Speed (MPH)	Acceleration/Deceleration	Parallel (P) or Taper (T) Ramp Type	Measured Length	Ramp Radius	Ramp Superelevation	Average Grade %	Flat Grade Length	Grade Factor	Required L
1-3.176	8	38	Ramp A- WB 44-County Road MM	70	20	D	T	14.30	1273.57	0.0%	-0.54%	570	1.00	570
1-3.176	8	38	Ramp B- County Road MM-WB 44	70	40	A	P	400.00	1273.57	0.0%	-0.54%	1000	1.00	1000
1-3.176	8	38	Ramp C- EB 44-County Road MM	70	20	D	T	75.90	1432.69	0.0%	0.54%	570	1.00	570
1-3.176	8	38	Ramp D- County Road MM-EB 44	70	40	A	T	400.00	1146.28	0.0%	0.54%	1000	1.00	1000
1-3.176	22	65	Ramp 1- EB 44-Route 266	70	30	D	P	300.00	955.37	6.0%	0.80%	520	1.00	520
1-3.176	22	65	Ramp 2- Loop Ramp-WB 44	70	15	A	P	1275.00	465.10	6.0%	-0.32%	1560	1.00	1560
1-3.176	22	65	Ramp 3- WB 44-Route 266	70	35	D	P	300.00	716.78	6.0%	-0.80%	490	1.00	490
1-3.176	22	65	Ramp 4- Route 266-EB 44	70	35	A	P	400.00	716.78	6.0%	0.32%	1230	1.00	1230
5-3.174B	4	15	Ramp 4- Rte 744-WB 44 Curve 4A	70	40	A	P	400.00	716.78	6.0%	3.00%	1000	1.00	1000
5.5-3.247	27	34,4	Ramp 1- Route 160- WB 44	70	40	A	P	400.00	954.93	8.0%	-2.50%	1000	1.00	1000
5.5-3.247	27	34,4	Ramp 2- EB 44- Route 160	70	25	D	P	450.00	954.93	8.0%	-2.50%	550	1.00	550
Current Project			Ramp 3- WB 44-Route 160	70	40	D	P	809.17	1909.86	5.0%	0.30%	440	1.00	440
Current Project			Ramp 4- Route 160- EB 44	70	35	A	P	1031.16	1146.56	8.0%	0.30%	1230	1.00	1230
Current Project			Ramp A- EB 44- Route 13	60	35	D	T	576.82	955.37	6.0%	0.34%	405	1.00	405
Current Project			Ramp B- Route 13- WB 44	60	35	A	T	771.16	955.37	6.0%	0.34%	800	1.00	800
Current Project			Ramp C- WB 44- Route 13	60	35	D	P	1253.28	955.37	6.0%	0.34%	405	1.00	405
Current Project			Ramp D- Route 13- EB 44	60	35	A	P	1170.82	955.37	6.0%	0.34%	800	1.00	800
Current Project			Ramp 1- Missouri H- WB 44	60	30	A	P	895.89	690.00	0.0%	0.35%	910	1.00	910
7.5-CD 120808	23	69	Ramp 3- EB 44- Missouri H	60	30	D	P	430.00	689.77	0.0%	0.30%	430	1.00	430
Current Project			Ramp 6- WB 44- Missouri H	60	30	D	T	589.51	467.72	0.0%	0.30%	430	1.00	430
Current Project			Ramp 8- Missouri H- EB 44	70	35	A	P	764.77	934.83	0.0%	0.55%	1230	1.00	1230
8.75-3.229	34	62	Ramp 1- WB-NB Route 65	70	40	D	P	365.00	954.93	8.0%	-0.80%	440	1.00	440
9-CD 120427	34	62	Ramp 2- SB-WB 44	70	30	A	P	350.00	2000.00	4.2%	0.62%	1350	1.00	1350

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Appendix E

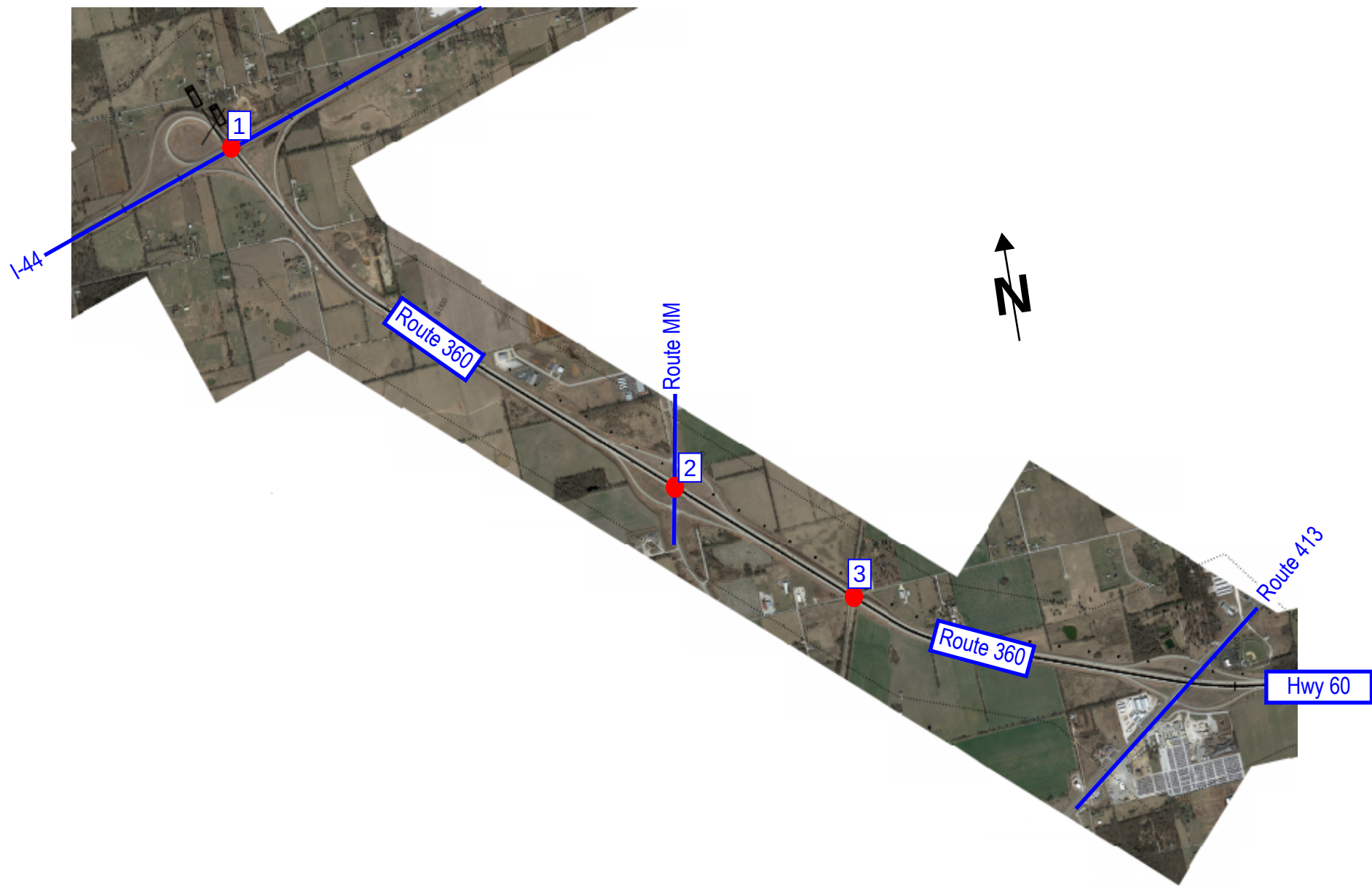
Bridge Analysis Tables

US 360 Bridges

From I-44 to Route 413

Date: 1/16/2018

Sheet: 1 of 1



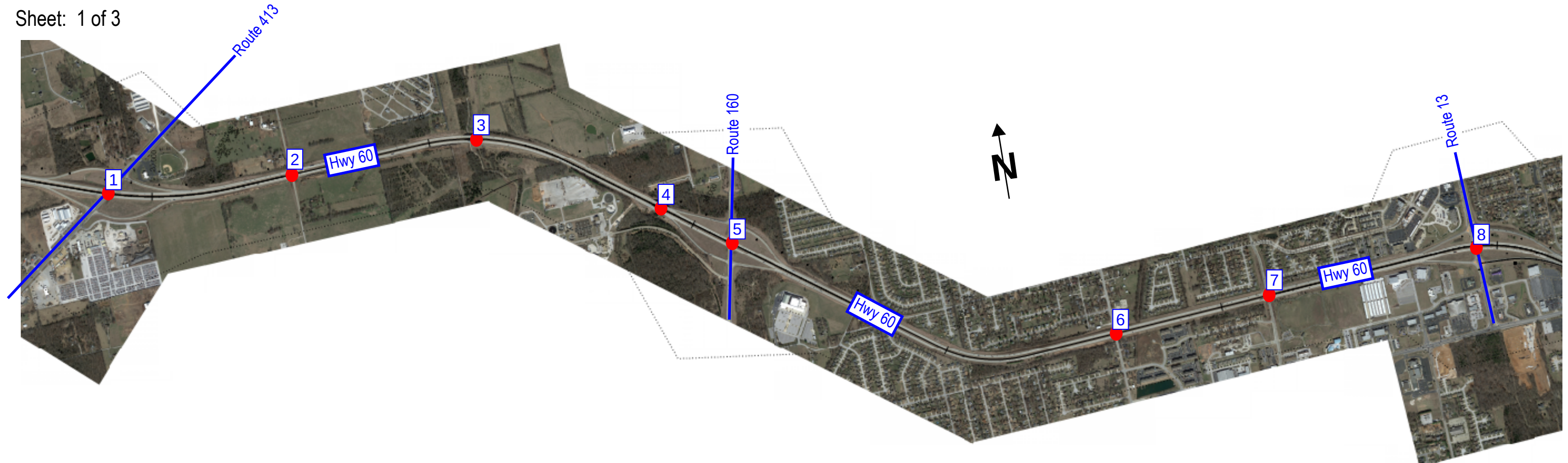
Location	Bridge No.	Description	Structure Type	Structure Length (ft)	Bridge Width (ft)	Vert. Clr. (ft)	Deck Rating	Super Rating	Sub Rating	Scope of Work	Cost
1	A5905	RP IS44W to MO360E over IS 44	Steel Plate Girders	296	30	17.33	7	7	8	Epoxy polymer overlay or hydro & latex	TBD
	A5906	MO 360 W over IS 44	Steel Plate Girders	296	30	18.33	7	7	8	Epoxy polymer overlay or hydro & latex	TBD
2	A5907	RT MM S over MO 360	Steel Plate Girders	336	56	16.33	7	7	7	Epoxy polymer overlay or hydro & latex	TBD
3	A5842	MO 360 E over CRD 156, BNSF RR	Steel Plate Girders	368	40	20.33	7	9	8	Epoxy polymer overlay or hydro & latex	TBD
	A5843	MO 360 W over CRD 156, BNSF RR	Steel Plate Girders	348	40	20.67	7	9	8	Epoxy polymer overlay or hydro & latex	TBD

US 60 Bridges

From Route 413 to Route 13

Date: 1/16/2018

Sheet: 1 of 3



Location	Bridge No.	Description	Structure Type	Structure Length (ft)	Bridge Width (ft)	Vert. Clr. (ft)	Deck Rating	Super Rating	Sub Rating	Scope of Work	Cost
1	A4141	MO 360 WB over MO 413, US 60	Steel Plate Girders	291	40	16.75	7	7	8	Seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace exp. jts.	TBD
	A4142	MO360 EB over MO 413, US 60	Steel Plate Girders	290	40	16.92	7	7	8	Seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace exp. jts.	TBD
2	A4139	Rte 115 S over US 60	Steel Plate Girders	266	35	16.92	7	7	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace	TBD
3	A4143	US 60 WB over Wilson Creek	P/S Concrete I-Girders	346	41	N/A	8	8	8	Seal or epoxy polymer or hydro & latex	TBD
	A4144	US 60 EB over Wilson Creek	P/S Concrete I-Girders	346	41	N/A	7	6	7	Seal or epoxy polymer or hydro & latex	TBD
4	A4147	US 60 WB over South Creek	P/S Concrete I-Girders	320	51	N/A	7	6	7	Seal or epoxy polymer or hydro & latex	TBD
	A4148	US 60 EB over South Creek	P/S Concrete I-Girders	320	51	N/A	7	6	8	Seal or epoxy polymer or hydro & latex	TBD
5	A4146	US 160 EB over US 60	Steel Plate Girders	298	81	18.00	7	7	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace	TBD
6	A4149	US 60 WB over S Golden Ave	P/S Concrete I-Girders	119	41	14.58	7	6	8	Seal or epoxy polymer or hydro & latex	TBD
	A4150	US 60 EB over S Golden Ave	P/S Concrete I-Girders	121	41	14.58	7	7	8	Seal or epoxy polymer or hydro & latex	TBD
7	A4140	Scenic Ave S over US 60	Steel Plate Girders	254	32	16.92	7	7	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace	TBD
8	A4185	MO 13 S over US 60	Steel Plate Girders	263	88	16.92	7	7	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / replace	TBD

US 60 Bridges (cont.)

From Route 13 to Glenstone Ave.

Date: 1/16/2018

Sheet: 2 of 3



Location	Bridge No.	Description	Structure Type	Structure Length (ft)	Bridge Width (ft)	Vert. Clr. (ft)	Deck Rating	Super Rating	Sub Rating	Scope of Work	Cost
9	A4184	Republic Road E over US 60	Steel Plate Girders	409	83	16.00	6	6	6	Overpass / remove asphalt overlay, replace w/ epoxy polymer or hydro & latex /	TBD
10	A4182	US 60 WB over Campbell Ave, US 160	P/S Concrete I-Girders	225	41	16.75	7	6	7	Seal or epoxy polymer or hydro & latex / misc. subst. repairs	TBD
	A4183	US 60 EB over Campbell Ave, US 160	P/S Concrete I-Girders	238	41	17.00+	7	6	6	Seal or epoxy polymer or hydro & latex / misc. subst. repairs	TBD
11	A4181	Republic Road W over US 60	Steel Plate Girders	489	72	16.00	7	8	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / reset b	TBD
12	A4179	US 60 EB over Ward Br. (Culvert Rating = 7)	Culvert	32	246	N/A	N/A	N/A	N/A	Widen if needed	TBD
13	A4177	National Ave S over US 60	Steel Plate Girders	274	99	16.92	7	8	6	Overpass / misc. subst. repairs / sandblast & paint at exp. jts. / coat abut. caps,	TBD
14	A4176	Fremont Ave S over US 60	P/S Concrete I-Girders	259	52	17.00+	7	5	7	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / sandbl	TBD
15	A4175	BU 60 S over US 60	Steel Plate Girders	268	88	16.58	7	7	6	Overpass / seal or epoxy polymer or hydro & latex / misc. subst. repairs / sandbl	TBD

US 60 Bridges (cont.)

From Glenstone Ave. to Route 247

Date: 1/16/2018

Sheet: 3 of 3

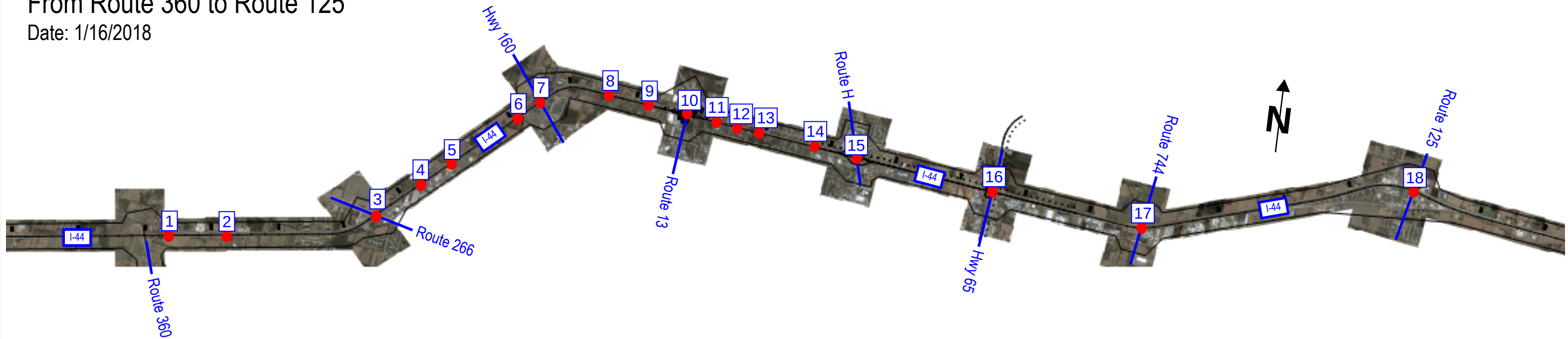


Location	Bridge No.	Description	Structure Type	Structure Length (ft)	Bridge Width (ft)	Vert. Clr. (ft)	Deck Rating	Super Rating	Sub Rating	Scope of Work	Cost
16	A7537	US 65 NB to US 60 WB Ramp over Galloway Creek, BNSF RR	P/S Concrete I-Girders	361	29	23.00	8	9	9	No work needed (built in 2009)	TBD
	A7538	US 60 WB over Galloway Creek, BNSF RR	P/S Concrete I-Girders	353	21	23.08	8	8	9	No work needed (built in 2009)	TBD
	A7539	US 60 EB over Galloway Creek, BNSF RR	P/S Concrete I-Girders	353	41	23.50	7	9	9	No work needed (built in 2009)	TBD
	A7540	US 60 EB to US 65 NB Ramp over Galloway Creek, BNSF RR	Steel Plate Girders & P/S I-Gdr	410	31	23.00	7	9	9	No work needed (built in 2009)	TBD
17	A2072	US 65 SB over US 60	Rolled Steel I-Beams	184	44	16.50	7	9	6	Overpass / 2008 superstructure replacement fixed any issues	TBD
	A7541	US 60 EB to US 65 NB Ramp over US 65 SB to US 60 EB	Steel Plate Girders & P/S I-Gdr	2018	32	16.75	7	9	9	No work needed (built in 2009)	TBD
	A7542	US 65 NB to US 60 WB Ramp over US 65 NB to US 60 EB	Steel Plate Girders	1646	34	16.50	6	9	6	No work needed (built in 2009, epoxy polymer overlay applied in 2010)	TBD
	A7543	US 65 NB over US 60	P/S Concrete I-Girders	223	60	17.17	7	9	9	Overpass / No work needed (built in 2009)	TBD
18	A1218	US 60 EB over James River	Steel Plate Girders	395	32	N/A	7	7	6	No work needed (2008 rehab was extensive)	TBD
	A7550	US 60 WB over James River	Steel Plate Girders	416	51	N/A	6	8	8	No work needed (built in 2009)	TBD
19	A8303	Rte J N over US 60	P/S Concrete I-Girders	139	63	16.67	8	9	9	Overpass / No work needed (built in 2015)	TBD
20	A8343	Rte 247 S over US 60	P/S Concrete NU-Girders	208	35	16.50	8	7	7	Overpass / No work needed (built in 2015)	TBD

I-44 Bridges

From Route 360 to Route 125

Date: 1/16/2018



Location	Bridge No.	Description	Structure Type	Structure Length (ft)	Bridge Width (ft)	Vert. Clr. (ft)	Deck Rating	Super Rating	Sub Rating	Scope of Work	Cost
1	A0177	IS 44 E over SAC RVR (Culvert Rating = 7)	Culvert	31	193	N/A	N/A	N/A	N/A	Extend existing culvert if neccessary	TBD
2	A8086	RT B S over IS 44	P/S Concrete NU Girders	171	49	17.08	9	9	9	New overpass-new interchange / no work needed	TBD
3	A0598	MO 266 E (W Chestnut Expy) over IS 44	Rolled Steel I-Beam	274	63	16.17	7	7	6	Overpass / redecked in 2007 / no work needed	TBD
4	A0712E	IS 44 E over BNSF RR	Rolled Steel I-Beam	158	34	23.25	7	7	7	Remove existing overlay / hydro & latex / if widened keep bridge and rehab	TBD
	A0712W	IS 44 W over BNSF RR	Rolled Steel I-Beam	158	34	23.25	7	7	7	Remove existing overlay / hydro & latex / if widened keep bridge and rehab	TBD
5	A0713	RT EE E over IS 44	Rolled Steel I-Beam	280	32	16.00	5	7	6	Overpass / hydro & latex / replace expansion devices / other misc. repairs	TBD
6	A0714	IS 44 W over MO 744, ABANDONED RR	Rolled Steel I-Beam	407	35	24.92	7	7	7	Rehab Programed 2018 = exp. jts. & brngs; Needs hydro & latex / sandblast & paint / if widened keep bridge	TBD
	A0715	IS 44 E over MO 744, ABANDONED RR	Rolled Steel I-Beam	443	35	24.33	7	6	7	Rehab Programed 2018 = exp. jts. & brngs; Needs hydro & latex / sandblast & paint / if widened keep bridge	TBD
7	A7953	US 160 E over IS 44	Steel Plate Girder	164	89	17.08	8	9	9	New overpass-new interchange / no work needed	TBD
8	A0441	127 E (W Melville Rd) over IS 44	Voided Slab	234	31	16.00	5	5	7	Remove exist. bridge	TBD
9	A0442	IS 44 E over SPRING CR (Culvert Rating = 6)	Culvert	25	315	N/A	N/A	N/A	N/A	Extend exist. culvert if neccessary	TBD
10	A0443	MO 13 S over IS 44	Voided Slab	203	73	16.17	6	7	6	Overpass / rehabilitated in 2008 / no work needed	TBD
11	A0444E	IS 44 E over CST BROADWAY AVE	Voided Slab	134	44	15.50	7	7	7	No work needed / replace if widened	TBD
	A0444W	IS 44 W over CST BROADWAY AVE	Voided Slab	134	44	15.50	7	7	7	No work needed / replace if widened	TBD
12	A0445E	IS 44 E over CST GRANT AVE (N Farm Road 151)	Voided Slab	139	44	15.08	7	7	7	No work needed / replace if widened	TBD
	A0445W	IS 44 W over CST GRANT AVE (N Farm Road 151)	Voided Slab	139	44	15.08	7	7	7	No work needed / replace if widened	TBD
13	A0446	IS 44 E over PEA RIDGE CR (Culvert Rating = 6)	Culvert	33	310	N/A	N/A	N/A	N/A	No work needed / may need to replace if grade is raised due to extra load	TBD
14	A0447E	IS 44 E over CST NATIONAL AVE	Voided Slab	134	44	15.08	7	7	7	No work needed / replace if widened	TBD
	A0447W	IS 44 W over CST NATIONAL AVE	Voided Slab	134	44	15.08	7	7	7	No work needed / replace if widened	TBD
15	A7501	RT H S over IS 44	P/S Concrete I-Girders	178	89	16.58	7	8	8	Overpass / no work needed	TBD
16	A7024	RP US65N to IS44W over RP IS44E to US65N, IS44	Steel Plate Girder	1383	41	16.42	6	9	7	Overpass / no work needed	TBD
	A2071	US 65 S over IS 44	Voided Slab	216	44	15.42	5	5	7	Overpass / if widened replace / if not widened hyrdo & latex	TBD
	A7300	US 65 N over IS 44	Rolled Steel I-Beam	132	55	16.67	8	9	8	New overpass-new interchange / no work needed	TBD
17	A4721	MO 744 E (N Farm Road 199) over IS 44	Steel Plate Girder	254	41	16.42	6	7	6	Overpass / hydro & latex / Replace exp. Jts. / overcoat paint / misc. subst. repairs	TBD
18	A5400	MO 125 S over IS 44	Voided Slab	226	72	16.92	7	7	7	Overpass / hydro & latex by 2026 according to District Bridge Engineer	TBD

Appendix F

Project Exhibits

**US 60 West Corridor
Project Exhibits**



SEE SHEET 2 OF 4 FOR CONTINUATION

DATE PREPARED
2/23/2018

ROUTE
360/60

DISTRICT
SW

STATE
MO

SHEET NO.

COUNTY
GREENE

JOB NO.
J8P3032

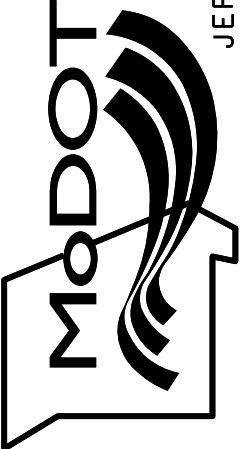
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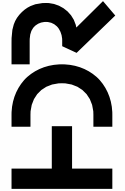
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DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)



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J8P3032 / US-60 - GLENSTONE INTERCHANGE

SEE SHEET 3 OF 4 FOR CONTINUATION

DATE PREPARED
2/23/2018

ROUTE
360/60

DISTRICT
SW

COUNTY
GREENE

JOB NO.
J8P3032

CONTRACT ID.

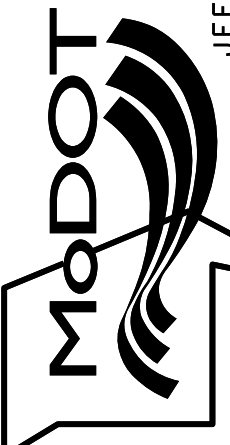
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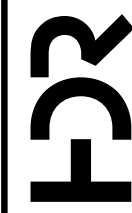
DATE

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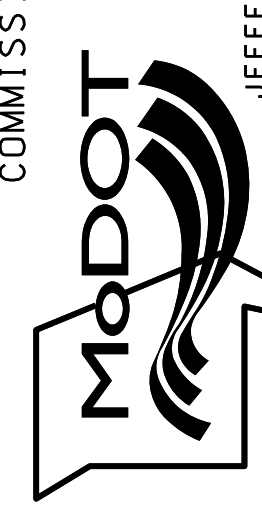


J8P3032 / US-60 - GLENSTONE INTERCHANGE

SHEET 3 OF 4 SHEETS

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360/60	MO
DISTRICT	SHEET NO.
SW	

COUNTY
GREENE

JOB NO.
J8P3032

CONTRACT ID.

PROJECT NO.

BRIDGE NO.

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360/60

STATE

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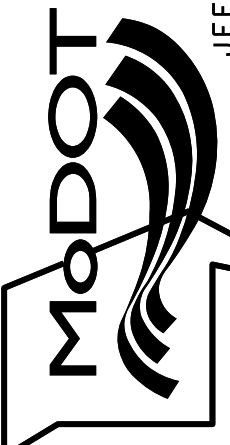
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BRIDGE NO.

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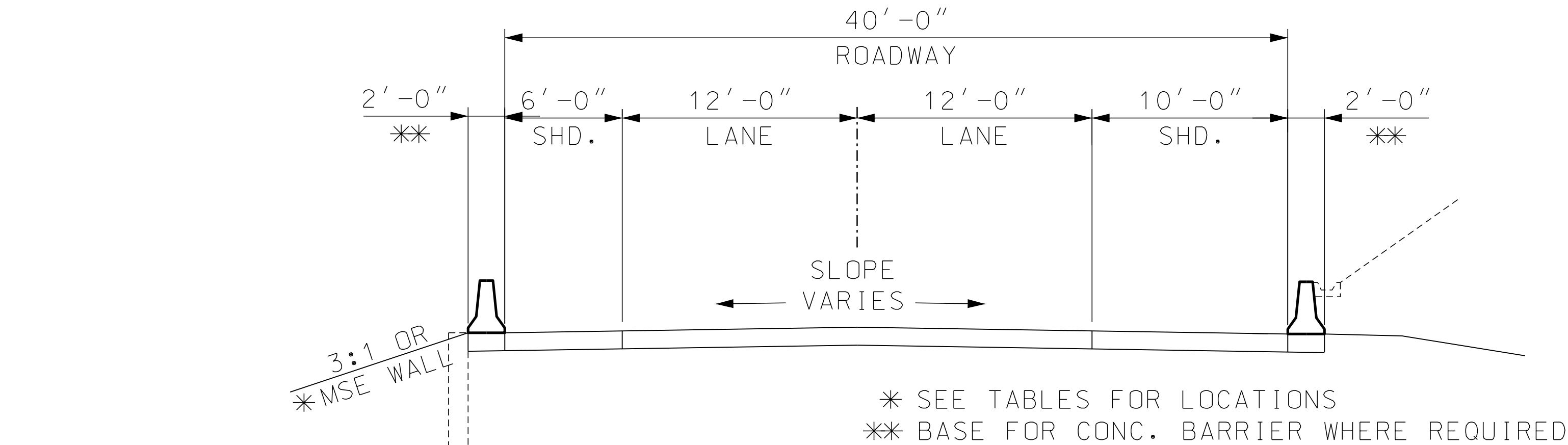
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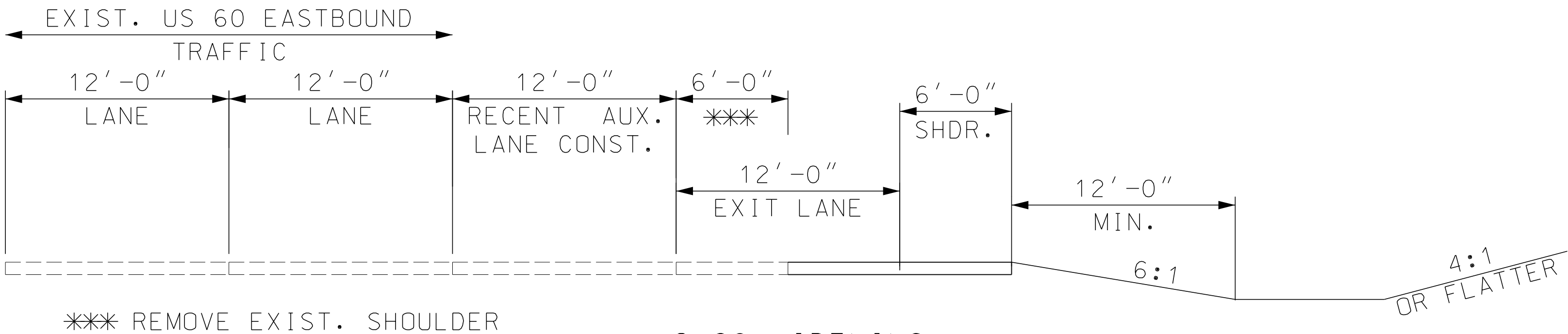
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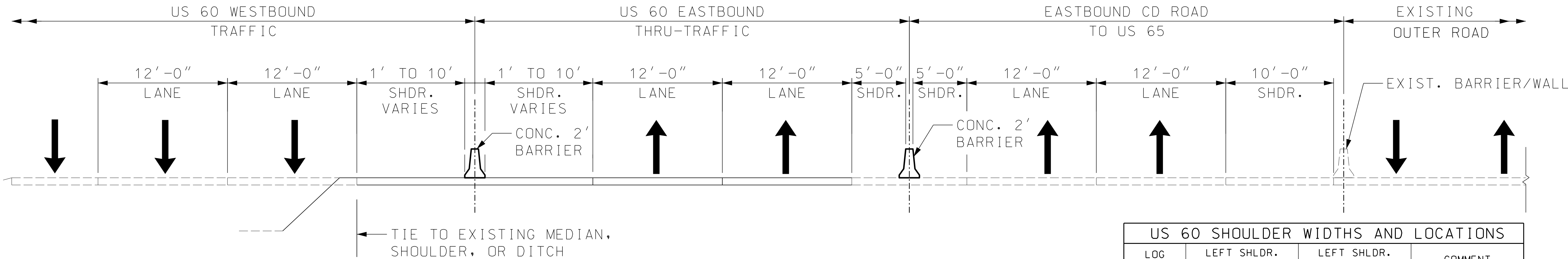
MSE WALLS (US 60)		
LOG MILE	LOCATION	COMMENT
86.17	RIGHT	950 SF - LEFT SIDE, CD ROAD
86.30	RIGHT	500 SF - BARRIER W/GUTTER, UNDER EXIST. BRIDGE



COLLECTOR DISTRIBUTION (C/D) ROAD
TYPICAL SECTION
LOG MILE 86.04 TO 86.47



US 60 WIDENING
TYPICAL SECTION
LOG MILE 85.70 TO 85.90



US 60 TYPICAL SECTION
LOG MILE 86.47 TO 87.47

US 60 SHOULDER WIDTHS AND LOCATIONS			
LOG MILE	LEFT SHLDR. WESTBOUND	LEFT SHLDR. EASTBOUND THRU	COMMENT
85.98	10'	10'	EXIST., MATCH
86.47	10'	10'	BEGIN TRANSITION
86.64	1'	1'	END TRANSITION
86.91	1'	1'	BEGIN TRANSITION
86.99	10'	10'	END TRANSITION
87.00	EXIST.	10'	EXIST. = 4'-6'
87.35	EXIST.	10'	BEGIN TRANSITION
87.47	EXIST.	6'	MATCH

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DISTRICT SW	SHEET NO.
COUNTY GREENE	
JOB NO. J8P3032	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	

DESCRIPTION	DATE

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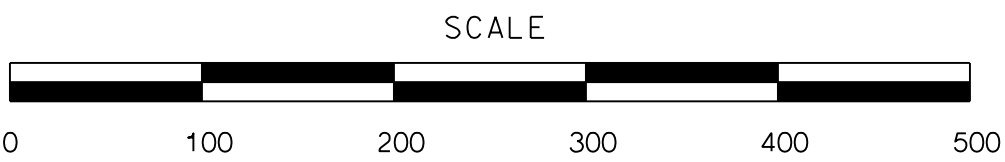
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J8P3032 / US-60 MM INTERCHANGE IMPROVEMENTS



DATE PREPARED

2/26/2018

ROUTE

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DISTRICT

SHEET NO.

COUNTY

JOB NO.

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PROJECT NO.

BRIDGE NO.

DESCRIPTION

DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

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FDR

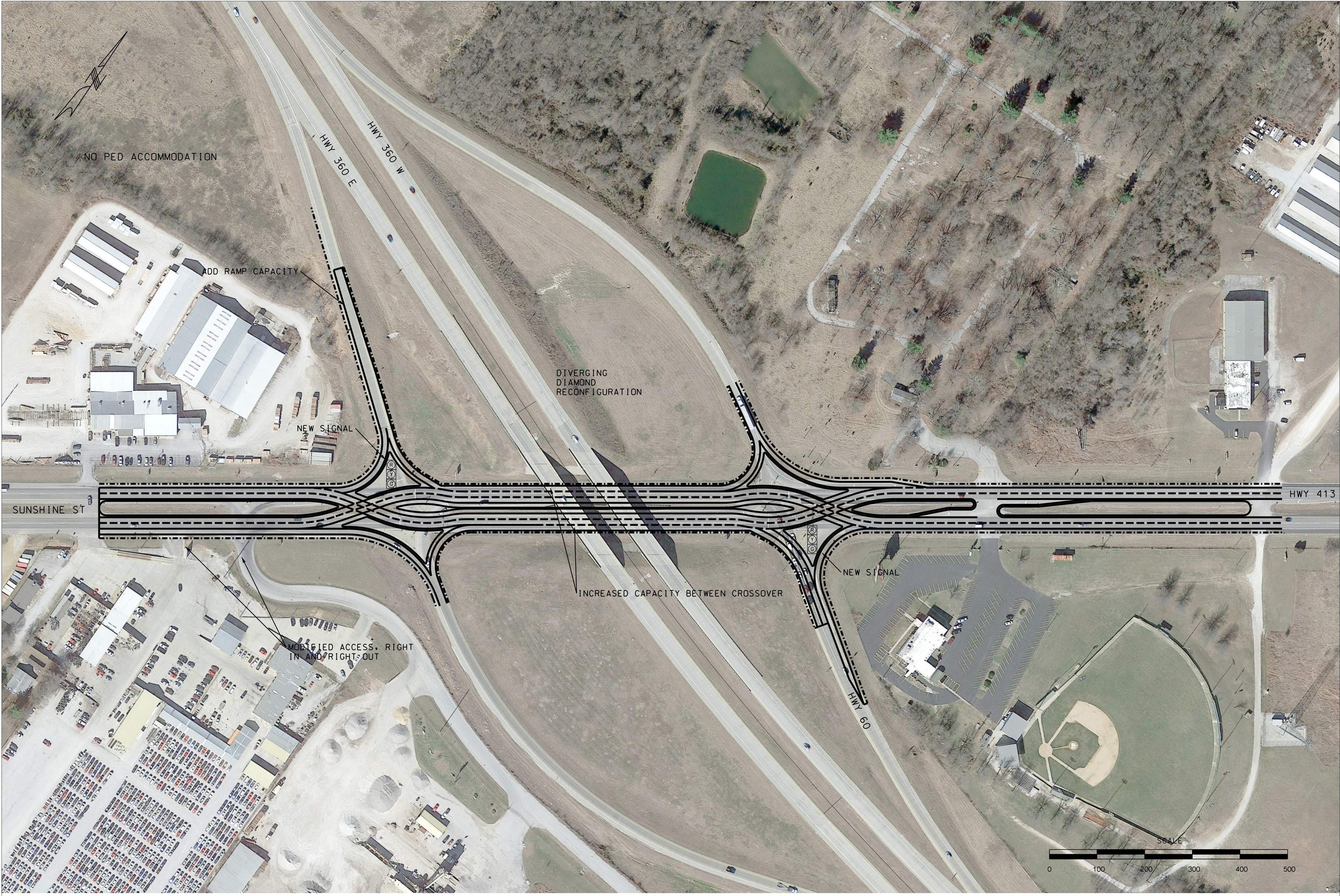
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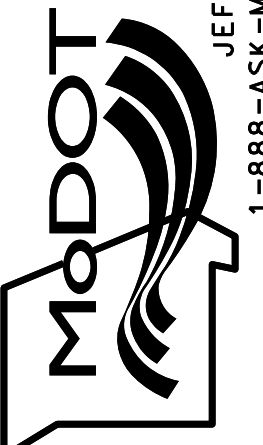
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J8P3032 / US-60 SUNSHINE INTERCHANGE IMPROVEMENTS

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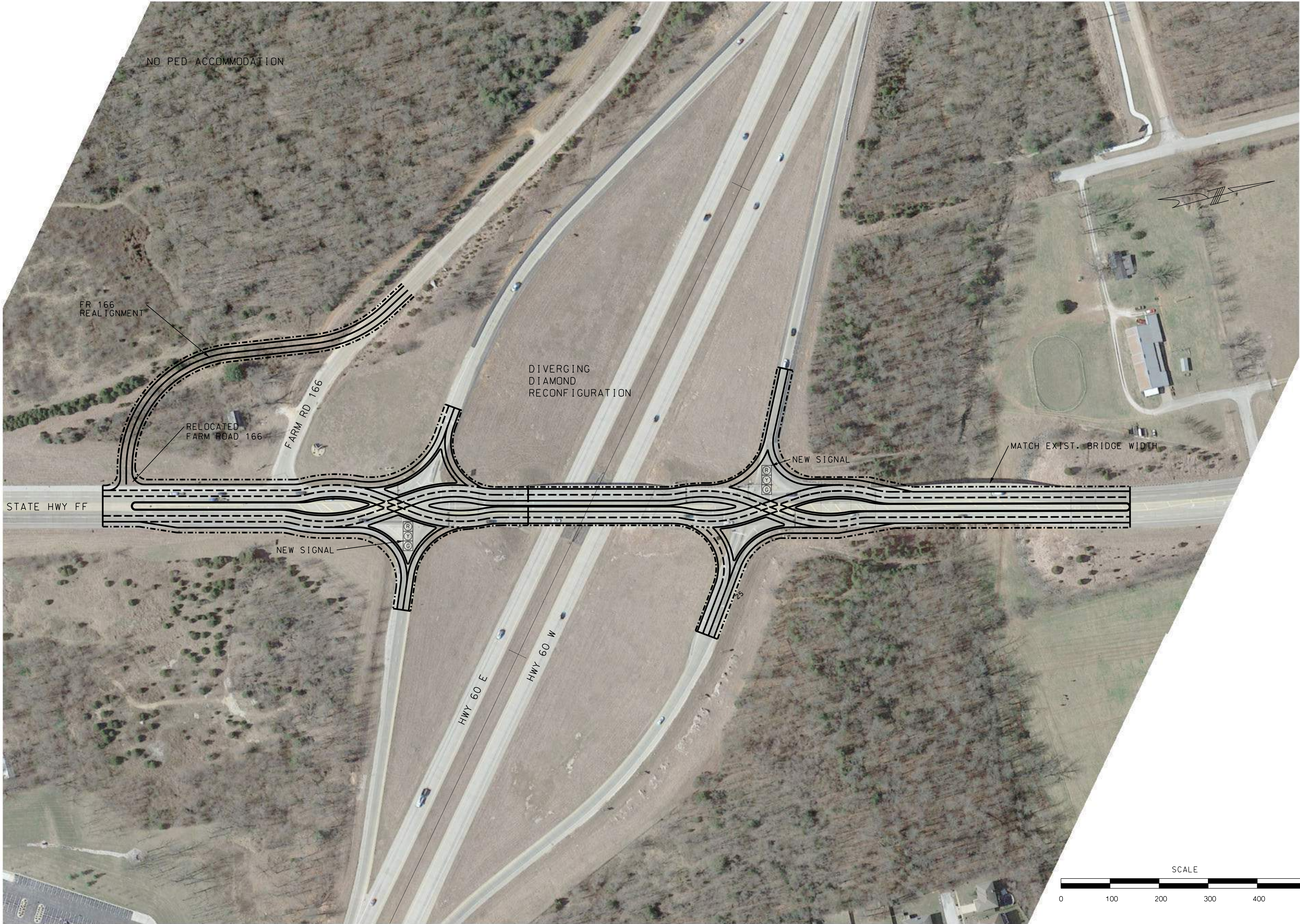


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ROUTE 360/60	STATE MO
DISTRICT SW	SHEET NO.
COUNTY GREENE	
JOB NO. J8P3032	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	
DATE	DESCRIPTION

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J8P3032 / HWY 60 & FF INTERCHANGE IMPROVEMENTS

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DISTRICT SW	SHEET NO.

COUNTY
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JOB NO.
J8P3032

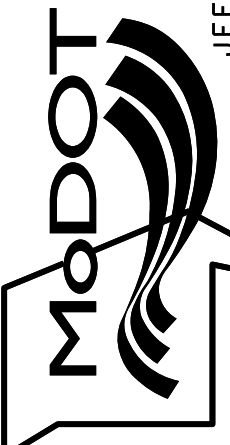
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PROJECT NO.

BRIDGE NO.

DESCRIPTION	DATE

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COUNTY

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JOB NO.

J8P3032

CONTRACT ID.

PROJECT NO.

BRIDGE NO.

DESCRIPTION

DATE

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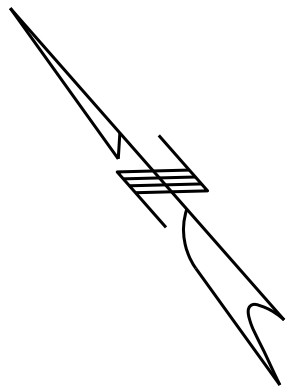
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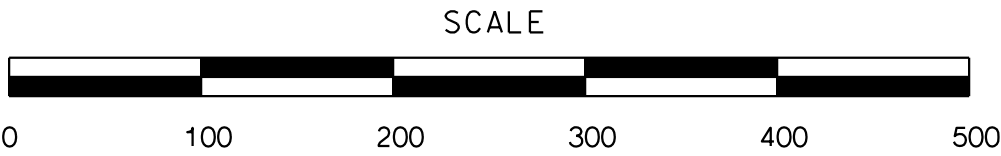
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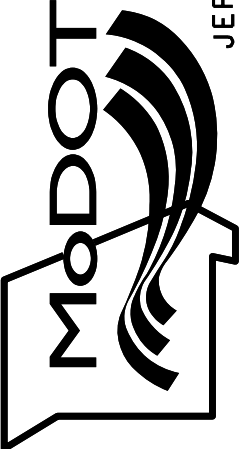
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J8P3032 / HWY 60 & 65 ACCEL/DECEL RAMP IMPROVEMENTS



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DATE PREPARED 2/27/2018	
ROUTE 360/60	STATE MO
DISTRICT SW	SHEET NO.
COUNTY GREENE	
JOB NO. J8P3032	
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	
DATE	DESCRIPTION
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION	
	
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**US 60 East Corridor
Project Exhibits**



J8P0683E / US-60 - ROUTE 125 INTERCHANGE

SHEET 1 OF 2 SHEETS

SEE SHEET 2 OF 2 FOR CONTINUATION

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MoDOT

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DATE PREPARED 2/26/2018	
ROUTE US-60	STATE MO
DISTRICT SW	SHEET NO.
COUNTY GREENE	
JOB NO.	
CONTRACT ID.	
PROJECT NO. J8P0683E	
BRIDGE NO.	

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J8P0683E / US-60 - ROUTE 125 INTERCHANGE

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DATE PREPARED
2/22/2018

ROUTE
US-60

STATE
MO

DISTRICT
SW

SHEET NO.

COUNTY
GREENE

JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683E

BRIDGE NO.

DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
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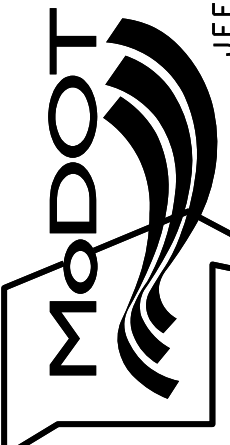
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SEE SHEET 2 OF 15 FOR CONTINUATION

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



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DATE PREPARED
2/22/2018

ROUTE US-60	STATE MO
DISTRICT SW	SHEET NO.

COUNTY
GREENE

JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683G

BRIDGE NO.

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This aerial photograph shows a highway interchange and surrounding landscape. The highway, labeled "US-60", runs horizontally across the middle. It has multiple lanes in both directions, with "12' WESTBOUND LANES" and "10' WESTBOUND SHOULDER" on the top side, and "12' EASTBOUND LANES" and "10' EASTBOUND SHOULDER" on the bottom side. "12' OUTER ROAD LANES" are also indicated on both sides. A "BARRIER" is shown on the right side of the highway. A mile marker "MILE 89 0" is visible on the right side of the highway. To the left, "S. FARM ROAD 181" intersects the highway, with "HIGHLAND SPRINGS BLVD." and "88-800" also labeled. To the right, "S. FARM ROAD 189" and "E MARY RD." are labeled. The surrounding area includes a golf course with sand traps and greenery, and a residential area with houses. A scale bar at the bottom right indicates distances from 0 to 500 feet.

SHEET 2 OF 15 SHEETS

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12' WESTBOUND LANES

10' WESTBOUND SHOULDER

12' OUTER ROAD LANES

US 60

BARRIER

10' EASTBOUND SHOULDER

12' EASTBOUND LANES

12' OUTER ROAD LANES

S. AMBER LN.

S. FARM ROAD 193

S. FARM ROAD 193

SCALE

0 100 200 300 400 500

SHEET 3 OF 15 SHEETS

4435 Main Street
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105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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[illegible]

DATE PREPARED
2/22/2018

COUNTY
GREENE

JOB NO.

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PROJECT NO.
J8P0683G
BRIDGE NO.

[illegible]

SEE SHEET 4 OF 15 FOR CONTINUATION

SEE SHEET 3 OF 15 FOR CONTINUATION



J8P0683C / US60 FREEWAY - HIGHLAND SPRINGS TO NN/J

SHEET 4 OF 15 SHEETS

SEE SHEET 5 OF 15 FOR CONTINUATION

DATE PREPARED

2/26/2018

ROUTE

US-60

STATE

MO

DISTRICT

SW

SHEET NO.

COUNTY

GREENE

JOB NO.

CONTRACT ID.

PROJECT NO.

J8P0683C

BRIDGE NO.

DESCRIPTION

DATE

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DATE

DESCRIPTION

DATE

DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

MoDOT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

FDR

HDR Engineering, Inc.

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DISTRICT
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SHEET NO.

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JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683C

BRIDGE NO.

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JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683C

BRIDGE NO.

SEE SHEET 4 OF 15 FOR CONTINUATION



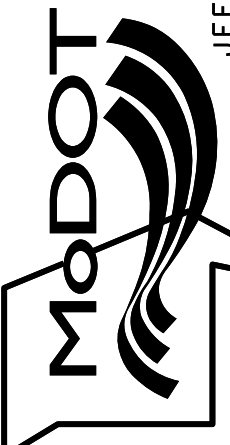
← J8P0683G / US60 FREEWAY
HIGHLAND SPRINGS TO NN/J

J8P0683G / US60 FREEWAY
NN/J TO FR213 →

SHEET 5 OF 15 SHEETS

SEE SHEET 6 OF 15 FOR CONTINUATION

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PROJECT NO.
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SEE SHEET 5 OF 15 FOR CONTINUATION



J8P0683G / US60 FREEWAY - NN/J TO FR213

SHEET 6 OF 15 SHEETS

SEE SHEET 7 OF 15 FOR CONTINUATION

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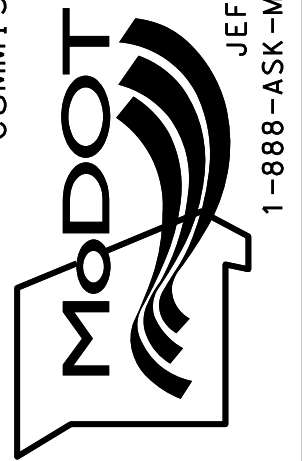
ROUTE US-60	STATE MO
DISTRICT SW	SHEET NO.

COUNTY
GREENE

JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683G
BRIDGE NO.

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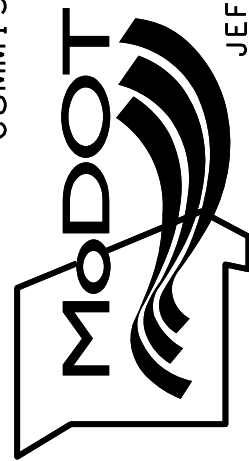
SEE SHEET 6 OF 15 FOR CONTINUATION



J8P0683G / US60 FREEWAY - NN/J TO FR213

SHEET 7 OF 15 SHEETS

SEE SHEET 8 OF 15 FOR CONTINUATION

[illegible]MISSOURI HIGHWAYS AND TRANSPORTATION
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ROUTE	STATE
US-60	MO

DISTRICT SW	SHEET NO.
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COUNTY
GREENE

JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683G

BRIDGE NO.

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SEE SHEET 7 OF 15 FOR CONTINUATION



← J8P0683 / US60 FREEWAY
- NN/J TO FR 213

J8P0683 / US60 FREEWAY
- FR213 TO RTE 125

SHEET 8 OF 15 SHEETS

SEE SHEET 9 OF 15 FOR CONTINUATION

[illegible]

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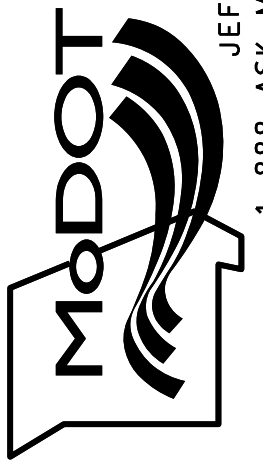
ROUTE US-60	STATE MO
DISTRICT	SHEET NO.

SW	
COUNTY	
GREENE	

JOB NO.

CONTRACT ID

PROJECT NO.	J8P0683G
BRIDGE NO.	

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J8P0683 / US-60 FREEWAY - FR 213 TO RTE 125

SHEET 9 OF 15 SHEETS

SEE SHEET 10 OF 15 FOR CONTINUATION

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ROUTE	STATE
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US-60	MO
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DISTRICT	SHEET NO
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GREENE

JUB NO.

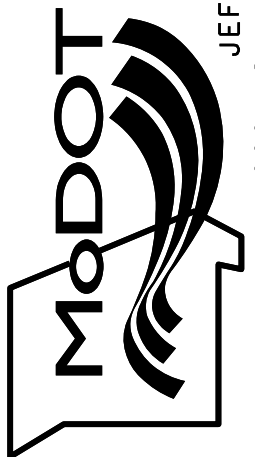
CONTRACT ID

CONTRACT ID:

PROJECT NO.

J8P0683G

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COMMISSION

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HDR
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1425 Main Street

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This aerial map illustrates a proposed road improvement project on US-60. The map shows the road's layout with 12-foot outer road lanes and 12-foot westbound and eastbound lanes. Key features include a drainage ditch, a barrier, and the intersection with S. Farm Road 223. A scale bar (0 to 500 feet) and a north arrow are provided for reference. The road is labeled 'US-60' and a mile marker 'MILE 93.0' is indicated.

SHEET 10 OF 15 SHEETS

OT
WAYS AND TRANSPORTATION
COMMISSION

105 WEST CAPITOL
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(8-ASK-MDOT (1-888-275-6636)

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DISTRICT	SHEET NO.
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SEE SHEET 11 OF 15 FOR CONTINUATION

← J8P0683G-US60 Freeway-FR213 to Rte 125 J8P0683E-US60 Freeway Rte 125 to FR247 →



SEE SHEET 13 OF 15 FOR CONTINUATION
J8P0683E / US60 FREEWAY - RTE 125 TO FR247

SHEET 12 OF 15 SHEETS

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ROUTE
US-60
DISTRICT
SW

STATE
MO
SHEET NO.

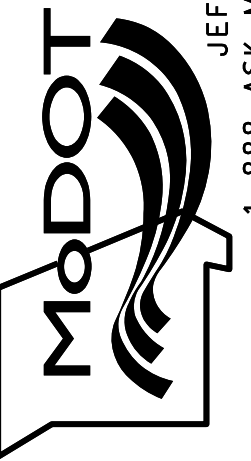
COUNTY
GREENE
JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683E
BRIDGE NO.

DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION
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SEE SHEET 12 OF 15 FOR CONTINUATION



J8P0683E / US60 FREEWAY - RTE 125 TO FR247

SHEET 13 OF 15 SHEETS

SEE SHEET 14 OF 15 FOR CONTINUATION

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J8P0683E / US60 FREEWAY - RTE 125 TO FR247

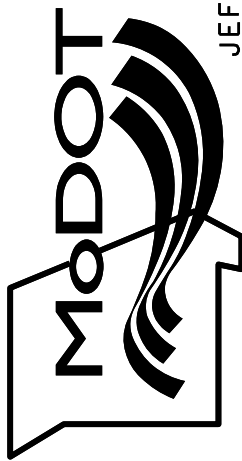
SHEET 14 OF 15 SHEETS

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ROUTE US-60	STATE MO
DISTRICT SW	SHEET NO.

COUNTY
GREENE
JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683E
BRIDGE NO.

[illegible]

SEE SHEET 15 OF 15 FOR CONTINUATION

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J8P0683E / US-60 FREEWAY - RTE 125 TO FR 247

SHEET 15 OF 15 SHEETS

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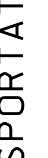
DATE PREPARED
2/22/2018

ROUTE US-60	STATE MO
DISTRICT SW	SHEET NO.

COUNTY
GREENE
JOB NO.

CONTRACT ID.

PROJECT NO.
J8P0683E
BRIDGE NO.

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SHEET 1 OF 2 SHEETS

MATCH LINE - SEE SHEET 2 OF 2 SHEETS

DATE PREPARED
3/8/2018

ROUTE
US-60

DISTRICT
SW

COUNTY
GREENE

JOB NO.

CONTRACT ID.

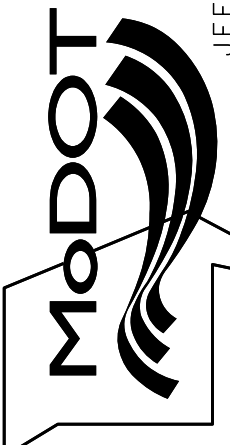
PROJECT NO.
J8P0683E

BRIDGE NO.

DATE

DESCRIPTION

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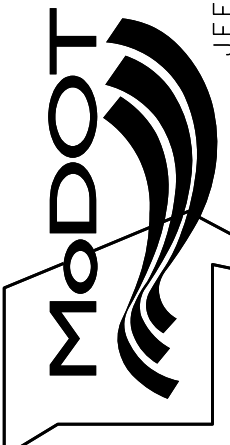
J8P0683E / US-60 - FR 189 INTERCHANGE

FR

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MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL
JEFFERSON CITY, MO 65102
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DATE PREPARED
3/8/2018

ROUTE
US-60

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STATE
MO

SHEET NO.

COUNTY
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JOB NO.

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PROJECT NO.
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**I-44 Corridor
Project Exhibits**



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ROUTE
I-44

STATE
MO

DISTRICT
SW

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COUNTY
GREENE

JOB NO.
J813044

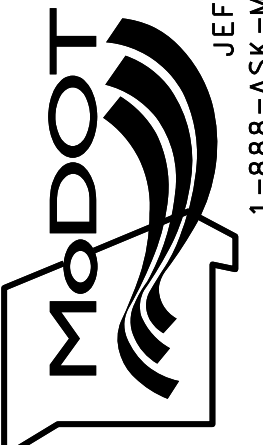
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BRIDGE NO.

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J813044 / US-44 AUX. LANES

SHEET 2 OF 3 SHEETS

SEE SHEET 3 OF 3 FOR CONTINUATION

DATE PREPARED
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ROUTE
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DISTRICT
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COUNTY
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JOB NO.
J813044

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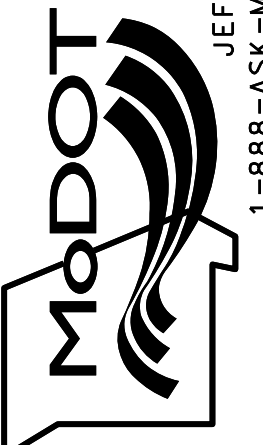
PROJECT NO.

BRIDGE NO.

DESCRIPTION

DATE

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COMMISSION



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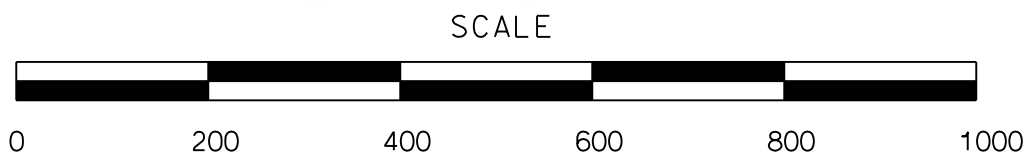
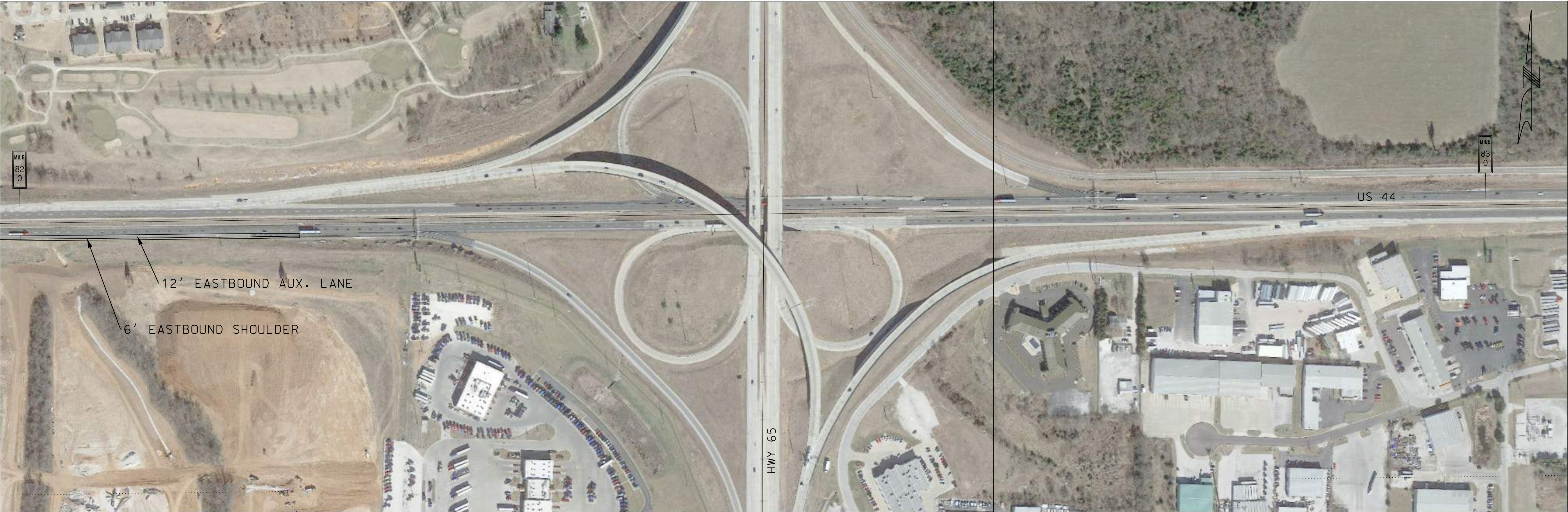
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DATE	DESCRIPTION

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BRIDGE NO.

COUNTY
GREENE
JOB NO.
J8I3044
CONTRACT ID.

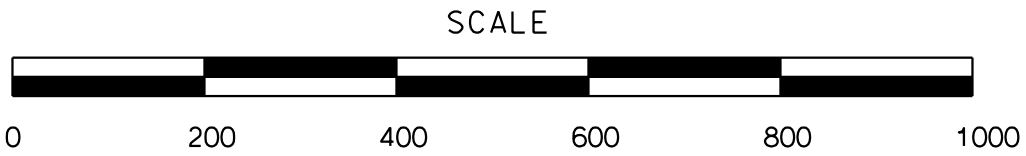
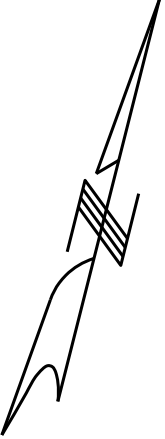
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STATE

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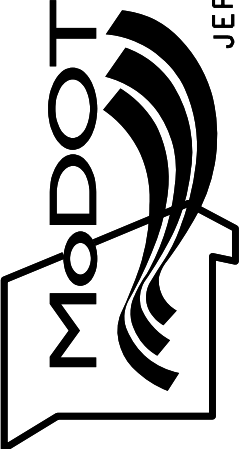
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BRIDGE NO.

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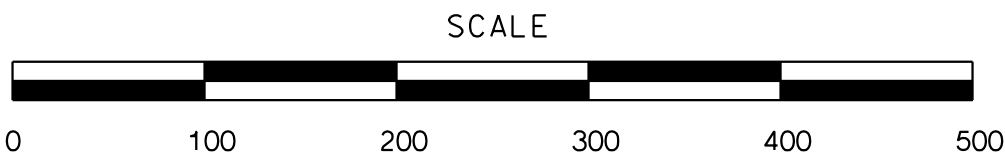
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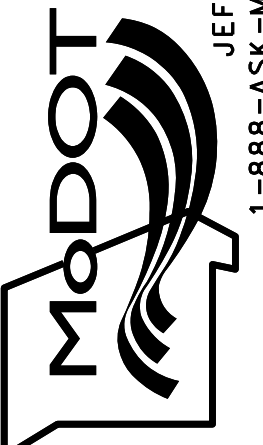
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BRIDGE NO.

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DATE PREPARED

2/26/2018

ROUTE

I-44

STATE

MO

DISTRICT

SW

SHEET NO.

COUNTY

GREENE

JOB NO.

J813044

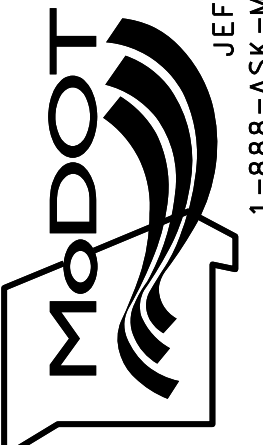
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PROJECT NO.

BRIDGE NO.

DATE	DESCRIPTION

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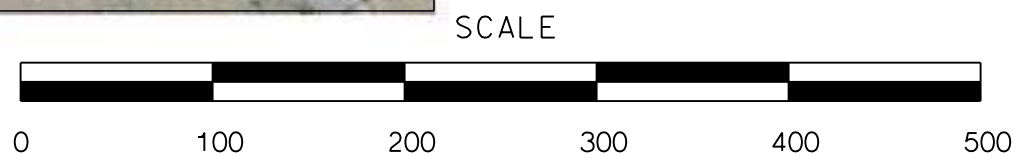
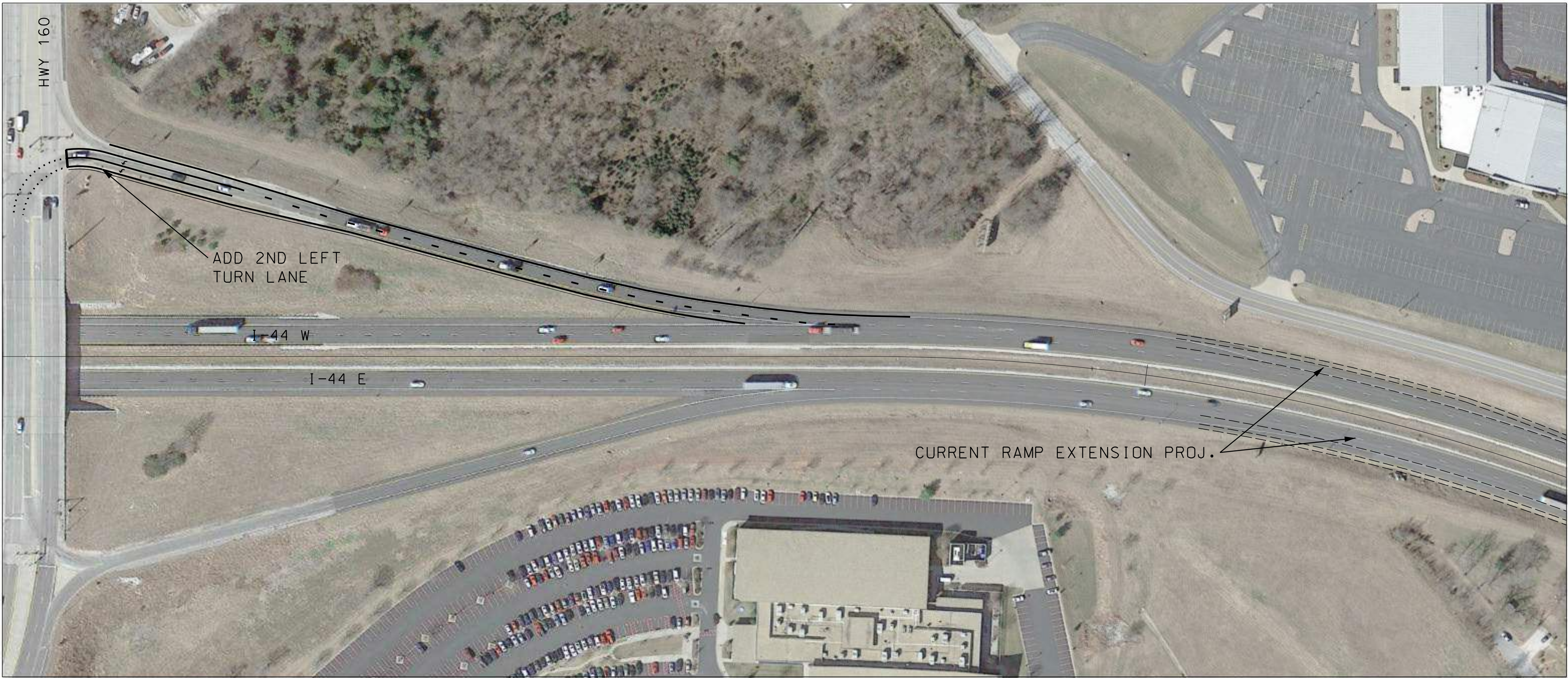
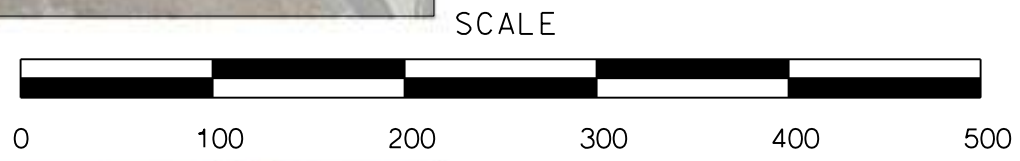
HDR Engineering, Inc.

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Suite 1000
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816-360-2700
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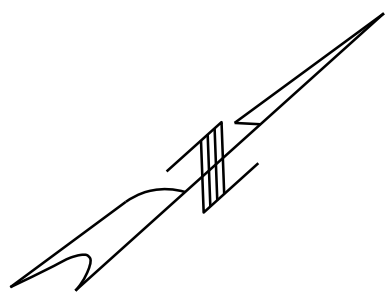
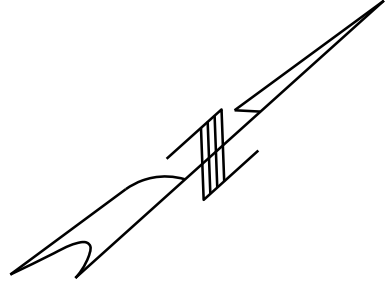
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SHEET NO.

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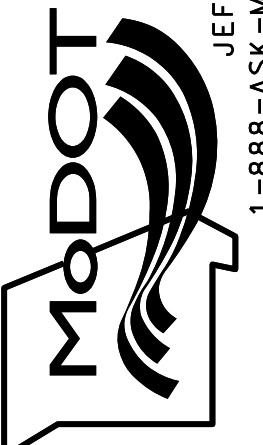
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PROJECT NO.

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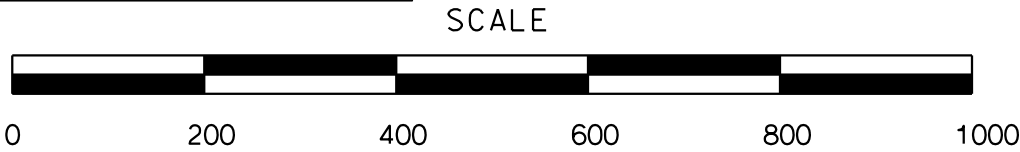
DATE	DESCRIPTION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

HDR HDR Engineering, Inc.
4435 Main Street
Suite 1000
Kansas City, MO 64111-1856
816-360-2700
Certificate of Authority: 000856



J813044 / I-44 & N FARM RD 199 INTERCHANGE IMPROVEMENTS

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DOCUMENT."

DATE PREPARED
2/27/2018

ROUTE I-44	STATE MO
DISTRICT SW	SHEET NO.

COUNTY
GREENE

JOB NO.
J813044

CONTRACT ID.

PROJECT NO.

BRIDGE NO.

DATE	DESCRIPTION

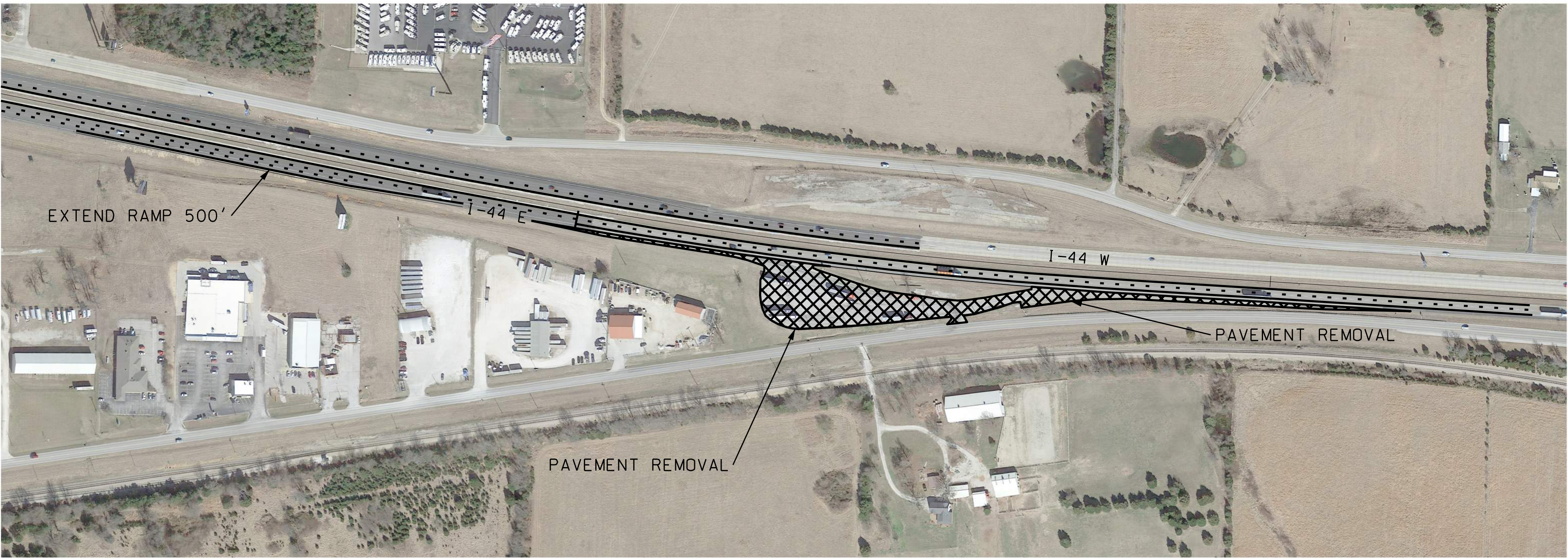
MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION

MoDOT

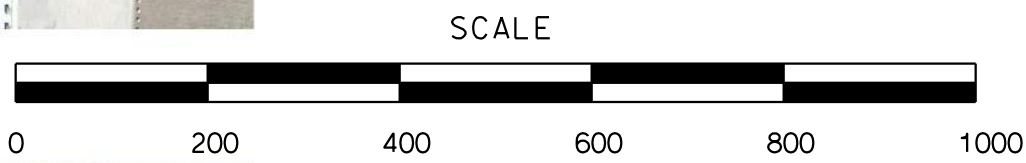
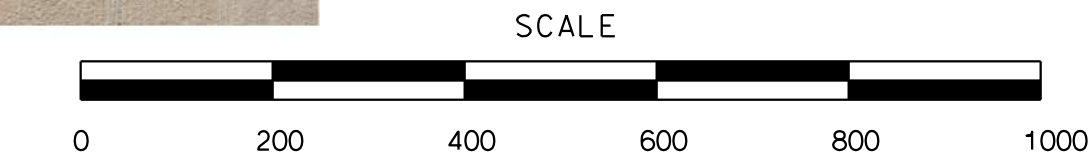
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

HDR HDR Engineering, Inc.

4435 Main Street
Suite 1000
Kansas City, MO 64111-1856
816-360-2700
Certificate of Authority: 000856



J813044 / I-44 & HWY 125 SIGNAL AND ACCELERATION LANE IMPROVEMENTS



HDR HDR Engineering, Inc.
4435 Main Street
Suite 1000
Kansas City, MO 64111-1856
816-360-2700
Certificate of Authority: 000856

MISSOURI HIGHWAYS AND TRANSPORTATION
COMMISSION
MoDOT
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

DATE	DESCRIPTION

BRIDGE NO.

PROJECT NO.

CONTRACT ID.

J813044

JOB NO.

GREENE

COUNTY

DISTRICT

SW

ROUTE

I-44

STATE

MO

DATE PREPARED

2/27/2018

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Appendix G
Detailed Cost Estimates

US 60 West Corridor Detailed Cost Estimate

			60W-1		60W-2		60W-3*		60W-4*		60W-5		60W-6	
			J8P3032		J8P3032		J8P3032		J8P3032		J8P3032		J8P3032	
FY 2018			US 60/Glenstone Interchange		US 60/MM Signals		US 60/Sunshine DDI		US 60/West Bypass DDI		US 60/US 65		US 60/ National Ave	
Item Description	Unit	Unit Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost
Interchange	LS													
Fill	CY	\$8	30,963	\$247,703		\$0		\$0		\$0		\$0		\$0
Linear Grading	Mile	\$350,000	3.0	\$1,057,027	0.2	\$70,000	0.5	\$175,000	0.7	\$245,000	0.4	\$147,159	0.3	\$88,163
Unclassified Excavation	CY	\$85	3,000	\$255,000		\$0	250	\$21,250	500	\$42,500	100	\$8,500	100	\$15,385
Drainage Improvements	Mile	\$350,000	4.0	\$1,397,614	0.2	\$70,000	1.0	\$350,000	1.4	\$490,000	0.4	\$140,000	0.3	\$88,163
GRADING/DRAINAGE SUBTOTAL				\$2,957,000		\$140,000		\$546,000		\$778,000		\$296,000		\$192,000
Interchange	LS													
Mainline Pavement and Base	SY	\$75	64,113	\$4,808,458	1,168	\$87,617	6,730	\$504,750	4,544	\$340,813	1,494	\$112,070	3,800	\$285,000
Outer Roads, Shoulders (Full Depth), and Base	SY	\$50	1,418	\$70,922	600	\$29,983	11,068	\$553,384	12,740	\$636,980	1,055	\$52,767	1,489	\$74,433
Low Type Surface and Base	SY	\$35	3,359	\$117,553		\$0	4,797	\$167,893	3,779	\$132,278		\$0		\$0
Pavement Overlay	SY	\$15	533	\$8,000		\$0	13,242	\$198,624	7,189	\$107,834	3,575	\$53,625		\$0
Pavement Removal	SY	\$10	39,578	\$395,776	535	\$5,351	2,000	\$20,000	4,000	\$40,000	1,495	\$14,950	2,687	\$26,872
PAVEMENT BASE/SURFACE SUBTOTAL				\$5,401,000		\$123,000		\$1,445,000		\$1,258,000		\$233,000		\$386,000
Interchange	LS													
Bridge (Includes Costs of MSE Walls for Bridges)	LS			\$1,428,000		\$0		\$650,000		\$525,000		\$0		\$0
Retaining Walls	SF	\$80	1,850	\$148,000		\$0		\$0		\$0		\$0	780	\$62,400
Noise Walls	SF	\$40	0	\$0		\$0		\$0		\$0		\$0	0	\$0
BRIDGE ITEMS SUBTOTAL				\$1,576,000		\$0		\$650,000		\$525,000		\$0		\$62,000
Concrete Safety Barrier	LF	\$50	15,738	\$786,900		\$0	850	\$42,500	326	\$16,275		\$0		\$0
Guardrail	LF	\$30	470	\$14,100	350	\$10,500	1,400	\$42,000	1,400	\$42,000		\$0	1,125	\$33,750
Guardrail End Terminal	EA	\$3,000	5	\$15,000	2	\$6,000	8	\$24,000	8	\$24,000		\$0	2	\$6,000
Curb/Gutter	LF	\$35	4,927	\$172,445		\$0		\$0		\$0		\$0	260	\$9,100
Traffic Signals	LS			\$525,000		\$350,000		\$450,000		\$450,000		\$35,000		\$25,000
Lighting	LS			\$202,000		\$0		\$67,500		\$67,500		\$0		\$5,000
Sign Structures (Overhead)	EA	\$100,000	7	\$700,000		\$0	2	\$200,000	2	\$200,000		\$0	1	\$100,000
Sign Structures (Cantilever)	EA	\$50,000	1	\$50,000		\$0	2	\$100,000	2	\$100,000		\$0		\$0
Sign Structures (Mast Arm)	EA	\$25,000	3	\$75,000		\$0	2	\$50,000	2	\$50,000		\$0	2	\$50,000
Signing and Pavement Marking (2% Grading & Pvmnt)	2%			\$167,000		\$5,000		\$40,000		\$41,000		\$11,000		\$12,000
Erosion Control (1% Grading & Pvmnt)	1.0%			\$84,000		\$3,000		\$20,000		\$20,000		\$5,000		\$6,000
Traffic Control	4%			\$509,000	LS	\$100,000		\$147,000		\$143,000	LS	\$100,000	LS	\$100,000
Mobilization (5% Total Const Cost)	5%			\$662,000		\$37,000		\$191,000		\$186,000		\$34,000		\$49,000
MISCELLANEOUS ITEMS SUBTOTAL				\$3,962,000		\$512,000		\$1,374,000		\$1,340,000		\$185,000		\$396,000
Subtotal Construction Cost Estimate				\$13,896,000		\$775,000		\$4,015,000		\$3,901,000		\$714,000		\$1,036,000
Contingency	5%			\$695,000		\$39,000		\$201,000		\$195,000		\$36,000		\$52,000
Total Construction Cost Estimate				\$14,591,000		\$814,000		\$4,216,000		\$4,096,000		\$750,000		\$1,088,000
Design & Survey	10%			\$1,460,000		\$80,000		\$420,000		\$410,000		\$80,000		\$110,000
Construction Engineering	5%			\$730,000		\$40,000		\$210,000		\$200,000		\$40,000		\$50,000
Utility Relocation (5% Grading and Pavement)	5%		LS	\$0	LS	\$0	LS	\$0		\$100,000	LS	\$0	LS	\$0
Right of Way (rural)	Acre	\$30,000		\$0		\$0		\$0	2.6	\$80,000		\$0		\$0
Right of Way (urban)	Acre	\$100,000		\$0		\$0		\$0		\$0		\$0		\$0
Right of Way Incidentals	Each	\$15,000		\$0		\$0		\$0	3	\$50,000		\$0		\$0
				\$16,781,000		\$934,000		\$4,846,000		\$4,936,000		\$870,000		\$1,248,000

* Projects 60W-3 and 60W-4 were not carried forward after refined operational analysis did not indicate a need.

US 60 East Corridor Detailed Cost Estimate

			60E-1		60E-2		60E-3		60E-4		60E-5		60E-6	
			J8P0683E		J8P0683G		J8P0683G		J8P0683G		J8P0683E		J8P0683E	
			US 60/125 Interchange		US 60 Fwy-Highland Springs to NN/J		US 60/FR 189 Intchg + Frontage Rds		US 60 Freeway-NN/J to e/o FR213		US 60 Freeway-e/o FR 213 to Rte 125		US 60 Freeway Rte 125 to FR 247	
Item Description	Unit	FY 2018 Unit Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost
Interchange	LS							\$2,250,000						
Fill	CY	\$8	146,658	\$1,173,261		\$0		\$0		\$0		\$0		\$0
Linear Grading	Mile	\$350,000	2.57	\$898,658	3.6	\$1,263,500	3.6	\$1,263,500	4.8	\$1,682,850	3.6	\$1,266,297	3.9	\$1,380,246
Unclassified Excavation	CY	\$85	1,666	\$141,610		\$0		\$0		\$0		\$0		\$0
Drainage Improvements	Mile	\$350,000	1.50	\$525,000	3.6	\$1,263,500	3.6	\$1,263,500	4.8	\$1,682,850	3.6	\$1,266,297	3.9	\$1,380,246
GRADING/DRAINAGE SUBTOTAL				\$2,739,000		\$2,527,000		\$4,777,000		\$3,366,000		\$2,533,000		\$2,760,000
Interchange	LS							\$4,402,000						
Mainline Pavement and Base	SY	\$75	41,453	\$3,108,983	31,596	\$2,369,675	31,596	\$2,369,675	50,355	\$3,776,650	37,401	\$2,805,067	21,293	\$1,596,983
Outer Roads, Shoulders (Full Depth), and Base	SY	\$50	19,220	\$960,989	62,310	\$3,115,481	62,310	\$3,115,481	56,266	\$2,813,308	48,665	\$2,433,233	64,534	\$3,226,689
Low Type Surface and Base	SY	\$35	11,276	\$394,664		\$0		\$0		\$0		\$0		\$0
Pavement Overlay	SY	\$15	0	\$0		\$0		\$0		\$0		\$0		\$0
Pavement Removal	SY	\$10	46,908	\$469,084	17,428	\$174,282		\$0		\$0	5,273	\$52,732	875	\$8,748
PAVEMENT BASE/SURFACE SUBTOTAL				\$4,934,000		\$5,659,000		\$9,887,000		\$6,590,000		\$5,291,000		\$4,832,000
Interchange	LS							\$2,050,000						
Bridge (Includes Costs of MSE Walls for Bridges)	LS			\$2,080,000		\$0		\$0		\$0		\$0		\$0
Retaining Walls	SF	\$80		\$0		\$0		\$0		\$0		\$0		\$0
Noise Walls	SF	\$40		\$0		\$0		\$0		\$0		\$0		\$0
BRIDGE ITEMS SUBTOTAL				\$2,080,000		\$0		\$2,050,000		\$0		\$0		\$0
Concrete Safety Barrier	LF	\$50	1,331	\$66,550	11,225	\$561,250	11,225	\$561,250	15,946	\$797,300	16,665	\$833,250	4,744	\$237,200
Guardrail	LF	\$30	3,104	\$93,120	300	\$9,000	300	\$9,000	500	\$15,000		\$0		\$0
Guardrail End Terminal	EA	\$3,000	2.0	\$6,000	2	\$6,000	2	\$6,000	2	\$6,000		\$0		\$0
Curb/Gutter	LF	\$35	2,761	\$96,646		\$0		\$0		\$0		\$0		\$0
Traffic Signals	LS			\$0		\$200,000		\$200,000		\$0		\$0		\$0
Lighting	LS			\$117,500		\$0		\$0		\$0		\$0		\$0
Sign Structures (Overhead)	EA	\$100,000		\$0		\$0		\$0		\$0		\$0		\$0
Sign Structures (Cantilever)	EA	\$50,000		\$0		\$0		\$0		\$0		\$0		\$0
Sign Structures (Mast Arm)	EA	\$25,000		\$0		\$0		\$0		\$0		\$0		\$0
Signing and Pavement Marking (2% Grading & Pvmnt)	2%			\$153,000		\$164,000		\$293,000		\$199,000		\$156,000		\$152,000
Erosion Control (1% Grading & Pvmnt)	1.0%			\$77,000		\$82,000		\$147,000		\$100,000		\$78,000		\$76,000
Traffic Control	4%			\$415,000		\$368,000		\$717,000		\$443,000		\$356,000		\$322,000
Mobilization (5% Total Const Cost)	5%			\$539,000		\$479,000		\$932,000		\$576,000		\$462,000		\$419,000
MISCELLANEOUS ITEMS SUBTOTAL				\$1,564,000		\$1,869,000		\$2,865,000		\$2,136,000		\$1,885,000		\$1,206,000
Subtotal Construction Cost Estimate				\$11,317,000		\$10,055,000		\$19,579,000		\$12,092,000		\$9,709,000		\$8,798,000
Contingency	5%			\$566,000		\$503,000		\$979,000		\$605,000		\$485,000		\$440,000
Total Construction Cost Estimate				\$11,883,000		\$10,558,000		\$20,558,000		\$12,697,000		\$10,194,000		\$9,238,000
Design & Survey	10%			\$1,190,000		\$1,060,000		\$2,060,000		\$1,270,000		\$1,020,000		\$920,000
Construction Engineering	5%			\$590,000		\$530,000		\$1,030,000		\$630,000		\$510,000		\$460,000
Utility Relocation (5% Grading and Pavement)	5%			\$380,000		\$410,000	LS	\$610,000		\$500,000		\$390,000		\$380,000
Right of Way (rural)	Acre	\$30,000	3.6	\$110,000	3.78	\$110,000	6.78	\$200,000	4.4	\$130,000	4.81	\$140,000	10.88	\$330,000
Right of Way (urban)	Acre	\$100,000		\$0		\$0	3	\$300,000		\$0		\$0		\$0
Right of Way Incidentals	Each	\$15,000	7	\$110,000	4	\$60,000	10	\$150,000	3	\$50,000	4	\$60,000	12	\$180,000
				\$14,263,000		\$12,728,000		\$24,908,000		\$15,277,000		\$12,314,000		\$11,508,000

I-44 Corridor Detailed Cost Estimate

			44-1		44-2		44-3		44-4		44-5		44-6		44-7		44-8	
			J8I3044		J8I3044		J8I3044		J8I3044		J8I3044		J8I3044		J8I3044		J8I3044	
			I-44 Aux Lanes		I-44/MM RAB		I-44/Chestnut		I-44/744 Accel Lane		I-44/West Bypass		I-44/US 65 SB-EB		I-44/FR199 RAB		I-44/125	
			Rte 13 to US 65		Accel/Decel		Loop				Accel/Decel		Flyover		Accel/Decel		Accel/Decel	
Item Description	Unit	Unit	Qty	Total Cost	Qty	Total Cost	Qty	Total	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost	Qty	Total Cost
Interchange	LS																	
Fill	CY	\$8	40,300	\$322,400		\$0		\$0		\$0	12,452	\$99,616		\$0	13,202	\$105,616		\$0
Linear Grading	Mile	\$350,000	5.0	\$1,760,500	1.39	\$487,216	0.15	\$53,030	0.35	\$122,500		\$0	0.7	\$255,208	1.4	\$497,027	0.4	\$145,436
Unclassified Excavation	CY	\$85	8,980	\$763,300	250	\$21,250		\$0	100	\$8,500	250	\$21,250	250	\$21,250	250	\$21,250	250	\$21,250
Drainage Improvements	Mile	\$350,000	5.0	\$1,760,500	1.39	\$487,216	0.15	\$53,030	0.35	\$122,500	0.15	\$52,500	0.7	\$255,208	1.4	\$490,000	0.4	\$140,000
GRADING/DRAINAGE SUBTOTAL				\$4,607,000		\$996,000		\$106,000		\$254,000		\$173,000		\$532,000		\$1,114,000		\$307,000
Interchange	LS																	
Mainline Pavement and Base	SY	\$75	93,848	\$7,038,600	17,724	\$1,329,325	1,050	\$78,750	3,616	\$271,200	1,667	\$125,002	6,543	\$490,750	11,734	\$880,064	2,295	\$172,129
Outer Roads, Shoulders (Full Depth), and Base	SY	\$50	36,667	\$1,833,350	6,550	\$327,478	543	\$27,133	1,764	\$88,200	947	\$47,367	3,266	\$163,322	5,029	\$251,474	1,429	\$71,433
Low Type Surface and Base	SY	\$35	845	\$29,575	2,179	\$76,273		\$0		\$0		\$0		\$0	233	\$8,160		\$0
Pavement Overlay	SY	\$15		\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$0
Pavement Removal	SY	\$10	59,200	\$592,000	22,240	\$222,397	532	\$5,320	3,904	\$39,044	751	\$7,508	3,213	\$32,127	2,139	\$21,390	9,408	\$94,081
PAVEMENT BASE/SURFACE SUBTOTAL				\$9,494,000		\$1,955,000		\$111,000		\$398,000		\$180,000		\$686,000		\$1,161,000		\$338,000
Interchange	LS																	
Bridge (Includes Costs of MSE Walls for Bridges)	LS			\$6,600,000		\$0		\$0		\$0		\$0		\$10,000,000		\$0		\$0
Retaining Walls	SF	\$80	2,600	\$208,000		\$0		\$0		\$0		\$0		\$0		\$0		\$0
Noise Walls	SF	\$40		\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$0
BRIDGE ITEMS SUBTOTAL				\$6,808,000		\$0		\$0		\$0		\$0		\$10,000,000		\$0		\$0
Concrete Safety Barrier	LF	\$50	2,550	\$127,500		\$0		\$0	433	\$21,650		\$0		\$0		\$0		\$0
Guardrail	LF	\$30	11,935	\$358,050	575	\$17,250		\$0	125	\$3,750	800	\$24,000	50	\$1,500	750	\$22,500		\$0
Guardrail End Terminal	EA	\$3,000	17	\$51,000	2.0	\$6,000		\$0	1.0	\$3,000	1	\$3,000	1	\$3,000	2	\$6,000		\$0
Curb/Gutter	LF	\$35	2,000	\$70,000	1,350	\$47,250		\$0		\$0		\$0		\$0	1,705	\$59,675		\$0
Traffic Signals	LS			\$25,000		\$0		\$0		\$0		\$30,000		\$0		\$0		\$175,000
Lighting	LS			\$50,000		\$113,000		\$0		\$32,500		\$12,000		\$18,000		\$93,500		\$12,000
Sign Structures (Overhead)	EA	\$100,000		\$0		\$0		\$0		\$0		\$0	1	\$100,000		\$0		\$0
Sign Structures (Cantilever)	EA	\$50,000	8	\$400,000		\$0		\$0		\$0		\$0	1	\$50,000		\$0		\$0
Sign Structures (Mast Arm)	EA	\$25,000	2	\$50,000		\$0		\$0		\$0		\$0		\$0		\$0		\$0
Signing and Pavement Marking (2% Grade & Pvmnt)	2%			\$282,000		\$59,000		\$4,000		\$13,000		\$7,000		\$24,000		\$46,000		\$13,000
Erosion Control (1% Grading & Pvmnt)	1.0%			\$141,000		\$30,000		\$2,000		\$7,000		\$4,000		\$12,000		\$23,000		\$6,000
Traffic Control	4%			\$899,000		\$129,000	LS	\$100,000	LS	\$100,000	LS	\$100,000		\$457,000	LS	\$100,000	LS	\$100,000
Mobilization (5% Total Const Cost)	5%			\$1,168,000		\$168,000		\$16,000		\$42,000		\$27,000		\$594,000		\$131,000		\$48,000
MISCELLANEOUS ITEMS SUBTOTAL				\$3,622,000		\$570,000		\$122,000		\$223,000		\$207,000		\$1,260,000		\$482,000		\$354,000
Subtotal Construction Cost Estimate				\$24,531,000		\$3,521,000		\$339,000		\$875,000		\$560,000		\$12,478,000		\$2,757,000		\$999,000
Contingency	5%			\$1,227,000		\$176,000		\$17,000		\$44,000		\$28,000		\$624,000		\$138,000		\$50,000
Total Construction Cost Estimate				\$25,758,000		\$3,697,000		\$356,000		\$919,000		\$588,000		\$13,102,000		\$2,895,000		\$1,049,000
Design & Survey	10%			\$2,580,000		\$370,000		\$40,000		\$90,000		\$60,000		\$1,310,000		\$290,000		\$100,000
Construction Engineering	5%			\$1,290,000		\$180,000		\$20,000		\$50,000		\$30,000		\$660,000		\$140,000		\$50,000
Utility Relocation (5% Grading and Pavement)	5%		LS	\$0		\$150,000	LS	\$0		\$30,000	LS	\$0	LS	\$0		\$110,000	LS	\$0
Right of Way (rural)	Acre	\$30,000		\$0	1.3	\$40,000		\$0	0.3	\$10,000		\$0		\$0	0.41	\$10,000		\$0
Right of Way (urban)	Acre	\$100,000		\$0		\$0		\$0		\$0		\$0		\$0		\$0		\$0
Right of Way Incidentals	Each	\$15,000		\$0	3	\$50,000		\$0	1	\$20,000		\$0		\$0	1	\$20,000		\$0
				\$29,628,000		\$4,487,000		\$416,000		\$1,119,000		\$678,000		\$15,072,000		\$3,465,000		\$1,199,000

Appendix H

Crash Modification Factors

Crash Modification Factors

Type	Description	Value	Applicable Projects	Quality	Crash Type	Crash Severity	Assumptions
Mainline Lanes	Add continuous auxiliary lane for weaving between entrance ramp and exit ramp	0.79	44-1	***	All	All	
	(Estimated) Add braided ramp roadway	0.5	60W-1	na	na	na	No similar CMF available. The project will eliminate weaving collisions that currently exist east of Glenstone. The braided ramp roadway may introduce typical sideswipes, but at a lower rate. This is the basis for the estimation.
Interchange Type	Convert at-grade intersection into grade-separated interchange	0.43	60E-1, 60E-2, 60E-3, 60E-4, 60E-5, 60E-6	*****	All	A,B,C	This CMF was applied to all crash severities. The CMF for all severities is slightly higher at 0.58. Due to the fact that in many locations the at-grade is removed without being replaced by an interchange, the lower CMF was assumed due to the lower number of conflicts.
	Convert diamond interchange to DDI	0.67	60W-1, 60W-3, 60W-4	****	All	All	
	Provide straight ramp instead of cloverleaf	0.55	44-6	***	All	All	
Ramp Design	Convert a Type I exit ramp to a Type III exit ramp	0.79	44-1	***	Truck related	All	This CMF was applied to truck and non-truck related crashes. Truck data was unavailable, and this CMF was closest in applicability.
	Extend acceleration lane by approx. 98 ft	0.89	44-2, 44-3, 44-4, 44-5, 44-7, 44-8, 60W-5	*****	All	All	Acceleration length extensions varied on each project and were generally longer than 98 ft., but this CMF has the closest applicability.
	Change length of deceleration lane from 101 - 200 ft. to 601 - 700 ft.	0.064	44-2	***	All	All	Deceleration length changes in actual projects may not match exactly as stated in the CMF, but the CMF with the closest total increase was chosen.
	Change length of deceleration lane from 401 - 500 ft. to 601 - 700 ft.	0.59	44-5, 60W-5	**	All	All	Deceleration length changes in actual projects may not match exactly as stated in the CMF, but the CMF with the closest total increase was chosen.
	Extend deceleration lane by approx. 100ft	0.93	44-7, 44-8	***	All	All	
	Change number of lanes on freeway exit ramp from X to Y	0.31	60W-6	***	All	All	
	(Estimated) Provide positive separation for acceleration lane	0.9	44-3, 44-4	na	na	na	No exact CMF available. Estimate based on various CMFs applicable to delineators, wide pavement markings, and channelization.
	(Estimated) Remove ramp access to/from truck parking	0.58	44-8	na	na	na	No exact CMF available. Estimate based on a combination of factors, but ultimately using the value for converting an at-grade intersection to a grade-separated interchange.
Intersection Design	Convert intersection with minor-road stop control to modern roundabout	0.56	44-2, 44-7	*****	All	All	
	Increase the number of left-turn lanes on major road	0.75	60W-1, 44-1, 44-5	***	Sideswipe	All	CMF was applied to all crash types. The CMF for installing a left-turn lane had a similar CMF value (0.748) and was stated to be applicable to all crash types. In the case of project 44-1, the CMF is applied due to addition of a right turn lane.
	Install a traffic signal and left turn lanes	0.54	60W-2	****	All	All	
	Install a traffic signal	0.56	44-8	*****	All	All	

Notes: Projects where dual left-turn lanes were converted to triple left-turn lanes were given a CMF of 1.0 (no crash reduction). A Texas study found that triple lefts did not raise any major safety issues. For projects 60E-2 and 60E-3, the CMF for installing a traffic signal, as shown in the table above, was not used. Adequate crash data did not exist at this location because the signal was installed during the last month of the crash data time period. A CMF of 1.0 was used in this case.

Source: Crash Modification Factors Clearinghouse, <http://www.cmfclearinghouse.org/index.cfm>

Appendix I

Mid-Project Preliminary Prioritization Results

The following page was transmitted to MoDOT on February 28, 2018 for assistance in formulating STIP inputs, with the understanding that the data was preliminary and based on the best information at that time. Between that time and the completion of this report, several refinements have been made that have resulted in adjustments to the prioritization tables. Key among these refinements were the following:

- The construction cost estimates were thoroughly reviewed, and adjustments were made to several unit costs. These changes caused variations in all the estimates, with some increasing and some decreasing.
- The traffic operational analysis was refined, adjusting signal timing, segmentation of the US-60 East corridor, ramp merge / diverge calculations, and driver behavior at the two-stage unsignalized intersections along US-60 East.
- The safety analysis was refined, including further adjustments of Crash Modification Factors (CMFs) and improvement influence areas.

Although these changes caused projects to move to various places on the prioritization list, the general order of the large (>\$9m) projects was preserved, as was the general order of the small projects.



B/C Ratio Methodology (Preliminary)

Ranking	Study Project #	Location	Project Description	Construction Costs	Total Costs	Rounded Costs	High Range	
1	44-8	I-44, at Route 125	Signalize the WB off-ramp terminal, extend the EB accel/decel and WB accel ramps, and close old weigh station	\$744,000	\$874,000	\$870,000	-	\$1,000,000
2	60W-6	US-60, at National	Add a 3rd left-turn lane at the EB off-ramp traffic signal and add a third right-turn lane at the WB off-ramp	\$1,020,000	\$1,190,000	\$1,190,000	-	\$1,370,000
3	44-5	I-44, at Highway 160 (West Bypass)	Add a 2nd left-turn lane at the WB off-ramp traffic signal and extend the EB decel and WB accel ramps	\$452,000	\$532,000	\$530,000	-	\$610,000
4	60W-5	US-60, at US-65	Extend the WB to SB decel ramp and the SB to EB accel ramp	\$398,000	\$468,000	\$470,000	-	\$540,000
5	60E-1	US-60, at Route 125	Convert at-grade signalized intersection to a grade separated interchange with double "peanut" roundabouts	\$11,888,000	\$14,238,000	\$14,240,000	-	\$16,380,000
6	60E-2	US-60, Highland Springs to J / NN	Close at-grade intersections and construct new outer roads and new freeway roadways, and signalize the WB off-ramp at J / NN	\$10,043,000	\$12,173,000	\$12,170,000	-	\$14,000,000
7	44-2	I-44, at MM / B	Construct roundabouts at both ramp terminals (tie-in frontage road on north-side) and extend all accel/decel ramps	\$3,356,000	\$3,986,000	\$3,990,000	-	\$4,590,000
8	60E-4	US-60, J / NN to East of FR 213	Close at-grade intersections and construct new outer roads and new freeway roadways	\$11,720,000	\$14,120,000	\$14,120,000	-	\$16,240,000
9	44-3	I-44, at Chestnut Expwy	Extend and provide positive separation for WB accel lane	\$242,000	\$282,000	\$280,000	-	\$320,000
10	60E-3	US-60, at FR 189	Convert to a grade separated interchange, close at-grade intersections, and construct new outer roads and new freeway roadways, and signalize the WB off-ramp at J / NN	\$20,043,000	\$24,353,000	\$24,350,000	-	\$28,000,000
11	44-7	I-44, at Mulroy	Construct roundabouts at both ramp terminals (tie-in frontage road on south-side) and extend all accel/decel ramps	\$2,398,000	\$2,848,000	\$2,850,000	-	\$3,280,000
12	60W-2	US-60/360, at MM	Signalize both ramp terminals and include left-turn lanes at both ramps	\$590,000	\$690,000	\$690,000	-	\$790,000
13	60E-5	US-60, East of FR 213 to Rte. 125	Close at-grade intersections and construct new outer roads and new freeway roadways	\$9,551,000	\$11,481,000	\$11,480,000	-	\$13,200,000
14	60W-1	US-60, National to US-65	Provide an EB braided ramp roadway and provide a DDI at Glenstone to reconfigure access to US 60	\$14,415,000	\$16,925,000	\$16,930,000	-	\$19,470,000
15	60W-4	US-60, at Route FF / US 160 (West Bypass)	Convert to interchange to a DDI and relocate nearby drive access	\$3,619,000	\$4,229,000	\$4,230,000	-	\$4,860,000
16	60W-3	US-60/360, at Route 413 (Sunshine)	Convert to interchange to a DDI and relocate nearby drive access	\$4,351,000	\$5,101,000	\$5,100,000	-	\$5,870,000
17	44-1	I-44, Route 13 (KS Expwy) to US-65	Provide auxiliary lanes between interchanges and provide an added 2nd right-turn lane for the WB off-ramp at Route 13, including minor shoulder improvements at the Glenstone interchange	\$25,396,000	\$29,816,000	\$29,820,000	-	\$34,290,000
18	60E-6	US-60, Route 125 to FR 247	Close at-grade intersections and construct new outer roads and new freeway roadways	\$8,467,000	\$10,707,000	\$10,710,000	-	\$12,320,000
19	44-6	I-44, at US-65	Construct a SB-to-EB flyover ramp and eliminate the existing cloverleaf	\$13,606,000	\$15,696,000	\$15,700,000	-	\$18,060,000
20	44-4	I-44, West of Route 744 (Kearney)	Extend and provide positive separation for WB accel lane	\$747,000	\$887,000	\$890,000	-	\$1,020,000

Net Benefits Methodology (Preliminary)

Ranking	Study Project #	Location	Project Description	Construction Costs	Total Costs	Rounded Costs	High Range	
1	60E-1	US-60, at Route 125	Convert at-grade signalized intersection to a grade separated interchange with double "peanut" roundabouts	\$11,888,000	\$14,238,000	\$14,240,000	-	\$16,380,000
2	60E-2	US-60, Highland Springs to J / NN	Close at-grade intersections and construct new outer roads and new freeway roadways, and signalize the WB off-ramp at J / NN	\$10,043,000	\$12,173,000	\$12,170,000	-	\$14,000,000
3	60E-4	US-60, J / NN to East of FR 213	Close at-grade intersections and construct new outer roads and new freeway roadways	\$11,720,000	\$14,120,000	\$14,120,000	-	\$16,240,000
4	60E-3	US-60, at FR 189	Convert to a grade separated interchange, close at-grade intersections, and construct new outer roads and new freeway roadways, and signalize the WB off-ramp at J / NN	\$20,043,000	\$24,353,000	\$24,350,000	-	\$28,000,000
5	44-8	I-44, at Route 125	Signalize the WB off-ramp terminal, extend the EB accel/decel and WB accel ramps, and close old weigh station	\$744,000	\$874,000	\$870,000	-	\$1,000,000
6	60W-6	US-60, at National	Add a 3rd left-turn lane at the EB off-ramp traffic signal and add a third right-turn lane at the WB off-ramp	\$1,020,000	\$1,190,000	\$1,190,000	-	\$1,370,000
7	44-2	I-44, at MM / B	Construct roundabouts at both ramp terminals (tie-in frontage road on north-side) and extend all accel/decel ramps	\$3,356,000	\$3,986,000	\$3,990,000	-	\$4,590,000
8	44-5	I-44, at Highway 160 (West Bypass)	Add a 2nd left-turn lane at the WB off-ramp traffic signal and extend the EB decel and WB accel ramps	\$452,000	\$532,000	\$530,000	-	\$610,000
9	60W-5	US-60, at US-65	Extend the WB to SB decel ramp and the SB to EB accel ramp	\$398,000	\$468,000	\$470,000	-	\$540,000
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12	60W-2	US-60/360, at MM	Signalize both ramp terminals and include left-turn lanes at both ramps	\$590,000	\$690,000	\$690,000	-	\$790,000
13	44-4	I-44, West of Route 744 (Kearney)	Extend and provide positive separation for WB accel lane	\$747,000	\$887,000	\$890,000	-	\$1,020,000
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15	60W-4	US-60, at Route FF / US 160 (West Bypass)	Convert to interchange to a DDI and relocate nearby drive access	\$3,619,000	\$4,229,000	\$4,230,000	-	\$4,860,000
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20	44-1	I-44, Route 13 (KS Expwy) to US-65	Provide auxiliary lanes between interchanges and provide an added 2nd right-turn lane for the WB off-ramp at Route 13, including minor shoulder improvements at the Glenstone interchange	\$25,396,000	\$29,816,000	\$29,820,000	-	\$34,290,000

- Not Recommended (b/c < 0.8)
- Existing MoDOT project is addressing some of the issues addressed by this project