INTERCHANGE JUSTIFICATION REPORT

FOR

AHTD JOB NO. CA0601; F.A.P NO. 9991

INTERSTATE 30

HIGHWAY 70 – SEVIER STREET (WIDENING)

Saline County, Arkansas

For

Prepared by

BRIDGEFARMER & ASSOCIATES, INC.

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INTRODUCTION

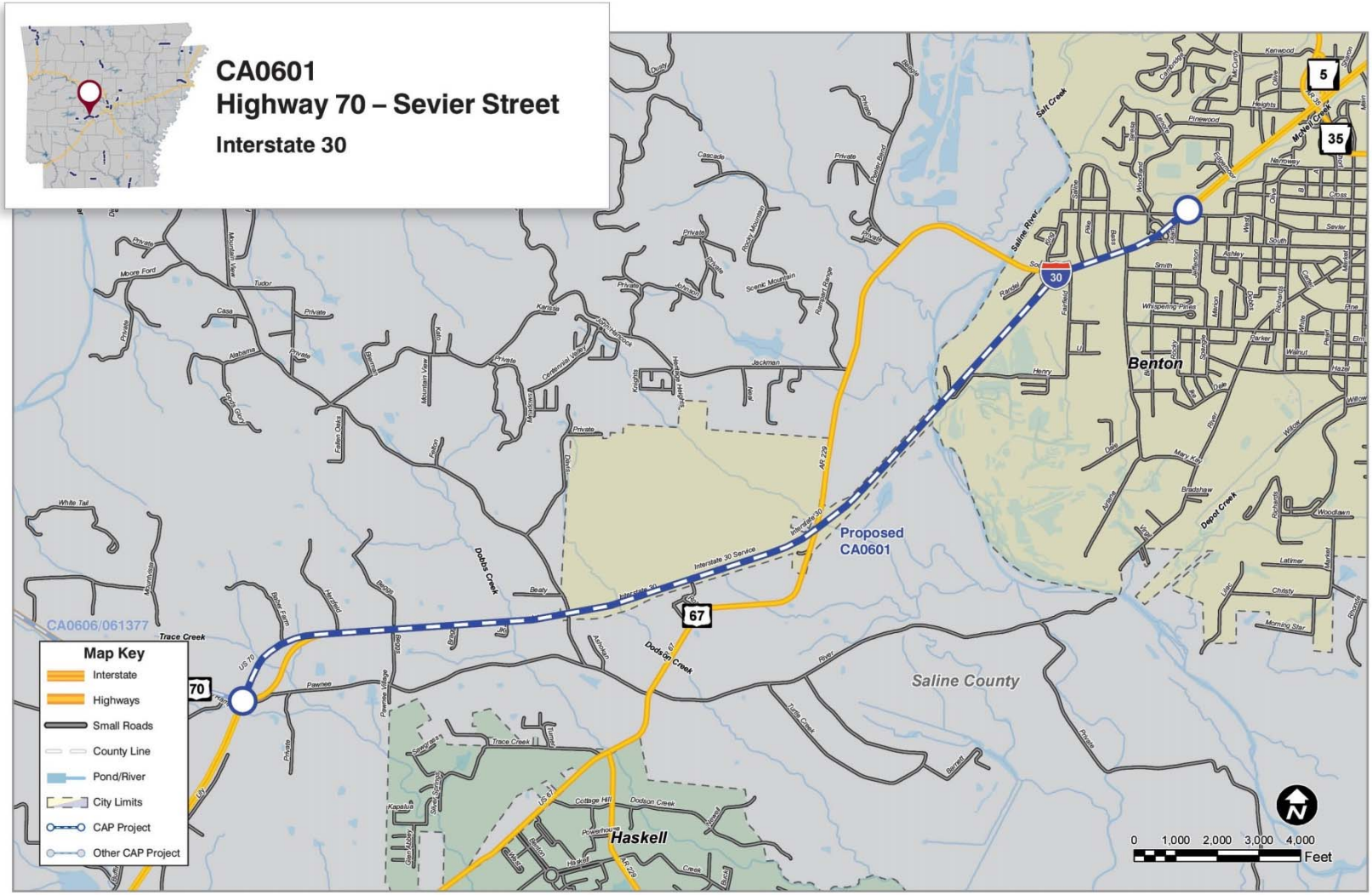
Congestion along the Interstate 30 corridor in Saline County, Arkansas has caused the Arkansas State Highway and Transportation Department (AHTD) to investigate improvements. The limits of the improvements proposed by AHTD along the Interstate 30 corridor are from Highway 70 to Sevier Street. This approximately five mile stretch of Interstate 30 includes improvements to the interchanges at Exit 111 (Highway 70), Inspection Station at Mile Marker 113, Exit 114 (Highway 67/Highway 229), and Exit 116 (Highway 229/South Street/Sevier Street). Figure 1 shows the limits of the study area. The influences considered during the analysis of design alternatives include future growth projections, impacts to local city streets as a result of proposed improvements, and probable limits of improvements. This report describes in detail the analyses performed and their results as they apply to both the No Build and Build Alternative. The proposed alternative meets one of the criteria for "Actions Requiring FHWA Access Approval" within the Procedures for New or Revised Freeway Access in Arkansas, June 2011. The criteria causing FHWA Access Approval is the modification of the existing interchange configurations at Highway 67/Highway 229 and also at South Street.

At the Highway 67/Highway 229 interchange, a new loop ramp will be built on the east side of Highway 67/229 for the northbound traffic to get on westbound Interstate 30, and the entrance ramp on the west side will be reconstructed for the southbound traffic along Highway 67/229 to get on westbound Interstate 30. The westbound entrance ramp from the southbound Highway 67/229 will become the fourth lane and will serve as an auxiliary lane before it terminates as an exit ramp to the Inspection station. The westbound exit ramp to Highway 67/229 will be reconstructed with two lanes and longer deceleration length. Also, the eastbound exit ramp will be separated from the South Frontage Road and will intersect directly to Highway 67.

At the South Street interchange the gore for the eastbound exit ramp will be shifted further west to provide a ramp with longer deceleration length. The eastbound entrance ramp instead of becoming the third eastbound lane as in the existing configuration will have an acceleration lane before merging into three eastbound lanes of Interstate 30.

This document is prepared in accordance with the Procedures for New or Revised Freeway Access in Arkansas, June 2011, to address the eight policy requirements of the Federal Highway Administration (FHWA) for new or revised access to the existing Interstate System.

Figure 1 – Job CA0601 - Interstate 30 Project Area



PURPOSE AND NEED

The purpose of the proposed improvement is to increase capacity and safety along the corridor and the interchanges by providing more travel lanes and modifying ramps. Widening Interstate 30 to three lanes in each direction will result in significant alleviation of congestion along the corridor as well as improved level-of-service. In addition, the proposed roadway improvements will accommodate future forecasted traffic volumes.

Existing Conditions

Interstate 30 enters Arkansas in Texarkana and extends northeasterly toward Little Rock, terminating at Interstate 40 in North Little Rock. The Interstate 30 corridor has a four lane cross section from Texarkana to Sevier Street in Benton and a six lane cross section from Sevier Street in Benton to Interstate 40. This widened section in Saline County and western Pulaski County serves as a vital route for local commuters in Bryant and Benton that are traveling to and from the Little Rock area. Interstate 30 also acts as a major truck route as it connects Little Rock, Arkansas to Dallas, Texas. From Highway 70 to Highway 67/Highway 229 and from east of the Saline River to South Street, Interstate 30 has two-way, two-lane frontage roads on either side. One-way, two-lane frontage roads begin on the westbound side of Interstate 30 at South Street and at Highway 5 on the eastbound side and continue through Benton into Little Rock. The frontage roads provide direct access to driveways and local and collector roads. The frontage roads from Highway 70 to Highway 67/Highway 229 terminate at Highway 67/Highway 229 with stop-controlled intersections. Slip ramps to the west of Highway 67/Highway 229 connect the frontage roads to Interstate 30. Frontage roads east of the Saline River connect to arterials via interchange ramp. Traffic on the frontage roads connecting the arterials to the ramps must yield to ramp traffic.

Highway 67 also enters Arkansas in Texarkana and travels parallel to Interstate 30, typically to the south/west of Interstate 30. Highway 229 begins at a bifurcation from Highway 8 near Fordyce, Arkansas and travels northerly into the city of Haskell where it joins Highway 67. The road carrying the dual designation of Highway 67/Highway 229 travels from Haskell to the interchange at Interstate 30 where the Highway 67 designation separates from Highway 229 and runs concurrently with Interstate 30 into Little Rock. Highway 229 continues north beyond the interchange with Interstate 30 and turns to cross the Saline River then terminates at beginning of the westbound entrance ramp to Interstate 30. The cross sections of these routes vary throughout their lengths, but throughout the project area the cross section is two-lane along dual Highway 67/Highway 229 and Highway 229.

The project passes through multiple land use areas including residential, commercial, agricultural, and recreational. A major residential and retail development is planned at the northwest corner of the

interchange of Interstate 30 with Highway 67/Highway 229. The development, known as the Benton Town Center, is expected to have 800 new homes and 800,000 square feet of retail development. The community of Haskell, located south of Interstate 30 along Highway 67 and Highway 229, is a rapidly growing community and home to the Arkansas Health Center, a 310-bed psychiatric nursing home.

East of the Saline River, the project corridor is urban and is fully developed on both sides of the proposed project. Land uses directly adjacent to the project are primarily commercial. The site of the former Saline County Airport, next to the Saline County Fairgrounds, is being redeveloped by the city of Benton into a community center, public-pool and water-sports center, adult activity center, and a Boys & Girls Club. The city of Benton also plans to renovate the Barnard Holland Baseball Complex, located adjacent to a city dog park and Lake Sunset, and to create soccer and softball complexes.

As Little Rock has expanded to the west and the cities in Saline County have grown, higher traffic volumes have resulted in high levels of congestion along this corridor. Continued growth and proposed developments are expected to exacerbate congestion.

Current and Forecast Traffic Demand

The peak hour volumes and the average daily traffic (ADT) volumes for Interstate 30, all ramps, and Highway 67 are derived from the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 – I-30 Widening, Highway 70 to Sevier Street, May 6, 2014," (CAP Traffic Report). Additional turning movement counts performed between August 25, 2014 and August 28, 2014 in the W. South Street interchange area because no traffic volumes were provided in the "Cap Traffic Report" except for the entrance and exit ramps. A 1.5% compounding growth rate was estimated by comparing the new turning movements to the previously provided traffic volumes from 2003 by AHTD at the W. South Street interchange area. The estimated 1.5% rate is between the 1.0% growth rate at W. Sevier Street and the 3.0% growth rate at Highway 229 provided in the "CAP Traffic Report". The additional counts indicated an increased PM projected traffic volume for the eastbound entrance ramp. The increased PM volumes were used since these volumes (675 for year 2018 and 920 for year 2038) exceeded the "CAP Traffic Report" volume. The Central Arkansas Regional Transportation Study (CARTS) travel demand model as well as historical growth trends were used to estimate future growth in the interchange area. The "CAP Traffic Report" uses a range of compounding growth rates from 1.0% to 3.0% to project the forecasted traffic data.

Sensitivity analysis was also performed by assuming the new Benton Town Center at the Highway 67/229 interchange will be partially populated in year 2018 and completely populated by year 2038. Estimated traffic volumes with development are shown in the CAP Traffic Report. Traffic volumes with Development from the sensitivity analysis have been used for the year 2018 and 2038 operational analysis and are shown in **Tables 1A**, **1B**, **2A**, and **2B** and also in the stick diagrams presented in

Appendix B. Peak hour volumes are derived from the "CAP Traffic Report" using Exhibits 7.1-7.5 for year 2018 and Exhibits 8.1-8.5 for year 2038.

The three main lane counts provided in the "CAP Traffic Report" are at A1 (Exhibits 7.5 & 8.5, "CAP Traffic Report") and A2/A3 (Exhibit 7.1 & 8.1, "CAP Traffic Report") located at the project limits. The peak hour volumes in between were estimated either by adding or subtracting the peak hour volumes provided in the "CAP Traffic Report" for entrance and exit ramps for different highway segments. Additionally peak hour volumes were balanced to remove minor discrepancies in the volumes provided in Exhibits 7.1-7.5 and Exhibits 8.1-8.5 from the "CAP Traffic Report". For example, when beginning with the A2 AM westbound count (1,000) for the 2018 traffic forecast and subtracting or adding for subsequent entrance and exit westbound ramps, a volume of 2,120 was estimated at count A1 location. The estimated volume of 2,120 does not match with the A1 volume of 2,100 provided in the "CAP Traffic Report". A similar process was done for the 2018 westbound PM, eastbound AM, and eastbound PM all starting with the A2 (Exhibit 7.1, "CAP Traffic Report") main lane count as it produced the most conservative balancing of the traffic volumes. These conservative volumes were used in the subsequent operational analysis and are shown in **Appendix B**. Likewise, the same process was done with the 2038 traffic forecast volumes starting with the A2 (2038 traffic forecast on Exhibit 8.1, "CAP Traffic Report") peak hour traffic volume for the westbound main lanes. For the eastbound main lanes, the volumes were balanced starting with the A1 (2038 traffic forecast on Exhibit 8.5, "CAP Traffic Report") peak hour traffic volume.

The current (2013), opening year (2018), and future (2038) traffic demand, in terms of average daily traffic volumes (ADT), are shown in **Appendix A**.

Operational Analysis

An operational analysis of the study area was conducted using the Highway Capacity Manual 2010 (HCM) methodologies. Synchro and HCS 2010 software were used to conduct the operational analysis of this project. HCS 2010 was used to model the freeway and ramps while Synchro was used to model Highway 67 and South Street. The output for both of these software uses the respective HCM 2010 analysis and reports. The Level-of-Service (LOS) obtained along Highway 67 and South Street was analyzed using the HCM 2010 signalized, two-way stop-controlled, and all-way stop-controlled intersection methodologies and are shown in **Tables 3A and 3B**. Levels-of-service (LOS) obtained using the HCM freeway facility methodologies are shown in **Tables 1A**, **1B**, **2A**, **2B**, and are documented in **Appendix D**. The stick diagrams titled "No Build" in **Appendix B** also show the peak hour traffic and the level-of-service along with the sketch level geometry of the existing four lane interstate.

Interstate 30 Operations

The eastbound peak hour is in the morning, making up the morning commute to Little Rock. Currently the Interstate 30 eastbound traffic slows at the Highway 67 entrance ramp due to the high ramp traffic entering the freeway in the morning and a short acceleration lane distance. From this entrance ramp to the segment between the South Street exit and entrance ramp operates at LOS D during the 2018 AM peak hour. With no improvements this eastbound section will operate at LOS F in 2038 from the Highway 67 entrance ramp all the way until the lane addition at Sevier/South Street entrance ramp. Also, in 2038, the eastbound lanes will operate at LOS E after the Highway 70 entrance ramp merges with Interstate 30 to the Highway 67 exit ramp and at the Highway 5 exit ramp.

The westbound peak hour is in the evening for returning commuters from Little Rock. The westbound Interstate 30 two lane segment west of the Sevier/South Street exit ramp will operate at LOS E in the PM peak hour of the "No Build" year 2018 alternative. The additional traffic from the South Street entrance ramp will cause traffic operations to deteriorate to LOS F from the South Street entrance ramp to the Highway 67 exit ramp during the PM peak hour in 2018. Without improvements, operations will deteriorate in 2038 to LOS F from the segment between the South Street ramps to the Highway 70 exit ramp. Interstate 30 LOS results are provided in **Tables 1A - 2B**.

Table 1A - NO-BUILD - Eastbound Peak Hour Traffic Volumes and Level-of-Service - 2018

Year 2018 No-Build[1] for Interstate 30 Eastbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT[2]		Truck Percent[4]		Main Lane or[5] Ramp LOS	
			AM[3]	PM[3]	AM	PM	AM	PM
West of Highway 70	Mainlane	2	1,300	1,400	26%	39%	A	B
Exit Ramp to Highway 70	Exit Ramp	1	40	100	0%	22%	B	B
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	1,260	1,300	26%	39%	A	B
Entrance Ramp from Highway 70	Entrance Ramp	1	910	710	3%	5%	C	B
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	2	2,170	2,010	17%	28%	B	B
Exit Ramp to Highway 67	Exit Ramp	1	200	400	0%	2%	C	C
Between Highway 67 Exit & Entrance Ramps	Mainlane	2	1,970	1,610	18%	29%	B	B
Entrance Ramp from Highway 67	Entrance Ramp	1	1,600	1,200	1%	3%	D	C
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	2	3,570	2,810	12%	22%	D	C
Exit Ramp to South Street	Exit Ramp	1	350	250	38%	36%	D	D
Between South Street Exit & Entrance Ramps	Mainlane	2	3,220	2,560	9%	21%	D	C
Entrance Ramp from South Street	Entrance Ramp[6.]	1	880	675	8%	3%	C	C
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane	3	4,100	3,235	10%	18%	C	C
Exit Ramp to Highway 5	Exit Ramp	1	700	750	1%	1%	D	C
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	3,400	2,485	8%	23%	C	B

Notes:

1. Assumes that no change is made to the existing Interstate 30 main lanes other than regular maintenance.
2. PHT - Peak Hour Traffic (volumes shown are for only Eastbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. Entrance Ramp is actually a lane addition and LOS is modeled as a basic section per HCM 2010

Table 1B - NO-BUILD - Westbound Peak Hour Traffic Volumes and Level-of-Service - 2018

Year 2018 No-Build[1] for Interstate 30 Westbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT[2]		Truck Percent[4]		Main Lane or[5] Ramp LOS	
			AM[3]	PM[3]	AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	1,820	3,610	19%	17%	A	C
Entrance Ramp from Highway 5	Entrance Ramp	1	300	500	1%	0%	B	C
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane[6.]	3	2,120	4,110	16%	15%	B	D
Exit Ramp to South Street	Exit Ramp	1	400	450	6%	3%	B	D
Between South Street Exit & South Street Overpass	Mainlane	3	1,720	3,660	18%	17%	A	C
Between South Street & South Street Entrance Ramps	Mainlane	2	1,720	3,660	18%	17%	B	E
Entrance Ramp from South Street	Entrance Ramp	1	250	500	3%	3%	B	F
Between South Street Entrance Ramp & US-67 Exit Ramp	Mainlane	2	1,970	4,160	16%	15%	B	F
Exit Ramp to Highway 67	Exit Ramp	1	700	1,800	6%	2%	C	F
Between Highway 67 Exit & Entrance Ramps	Mainlane	2	1,270	2,360	25%	22%	B	C
Entrance Ramp from Highway 67	Entrance Ramp	1	100	400	0%	1%	B	D
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	2	1,370	2,760	24%	22%	B	C
Exit Ramp to Highway 70	Exit Ramp	1	460	1,100	8%	1%	B	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	910	1,660	33%	33%	A	B
Entrance Ramp from Highway 70	Entrance Ramp	1	90	40	0%	10%	A	B
West of Highway 70	Mainlane	2	1,000	1,700	32%	33%	A	B

Notes:

1. Assumes that no change is made to the existing Interstate 30 main lanes other than regular maintenance.
2. PHT - Peak Hour Traffic (volumes shown are for only Westbound directions).
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.

Table 2A - NO-BUILD - Eastbound Peak Hour Traffic Volumes and Level-of-Service - 2038

Year 2038 No-Build[1.] for Interstate 30 Eastbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT[2.]		Truck[4.] Percent		Main Lane or Ramp LOS[5.]	
			AM[3.]	PM[3.]	AM	PM	AM	PM
West of Highway 70	Mainlane	2	2,070	2,470	26%	39%	B	C
Exit Ramp to Highway 70	Exit Ramp	1	70	200	0%	22%	C	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	2,000	2,270	26%	39%	B	C
Entrance Ramp from Highway 70	Entrance Ramp	1	1,500	1,250	3%	5%	D	D
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	2	3,500	3,520	17%	28%	D	E
Exit Ramp to Highway 67	Exit Ramp	1	350	750	0%	2%	E	E
Between Highway 67 Exit & Entrance Ramps	Mainlane	2	3,150	2,770	18%	29%	D	D
Entrance Ramp from Highway 67	Entrance Ramp	1	1,900	1,700	1%	3%	F	F
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	2	5,050	4,470	12%	22%	F	F
Exit Ramp to South Street	Exit Ramp	1	600	450	38%	36%	F	F
Between South Street Exit & Entrance Ramps	Mainlane	2	4,450	4,020	9%	21%	F	F
Entrance Ramp from South Street	Entrance Ramp[6.]	1	1,050	920	8%	3%	D	D
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane	3	5,500	4,940	10%	18%	D	D
Exit Ramp to Highway 5	Exit Ramp	1	1,000	1,100	1%	1%	E	E
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	4,500	3,840	8%	23%	C	C

Notes:

1. Assumes that no change is made to the existing Interstate 30 main lanes other than regular maintenance.
2. PHT - Peak Hour Traffic (volumes shown are for only Eastbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. Entrance Ramp is actually a lane addition and LOS is modeled as a basic section per HCM 2010

Table 2B - NO-BUILD - Westbound Peak Hour Traffic Volumes and Level-of-Service - 2038

Year 2038 No-Build [1.] for Interstate 30 Westbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT [2.]		Truck [4.] Percent		Main Lane or [5.] Ramp LOS	
			AM [3.]	PM [3.]	AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	2,550	4,950	19%	17%	B	D
Entrance Ramp from Highway 5	Entrance Ramp	1	450	750	1%	0%	B	D
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane [6.]	3	3,000	5,700	16%	15%	C	E
Exit Ramp to South Street	Exit Ramp	1	450	500	6%	3%	C	E
Between South Street Exit & South Street Overpass	Mainlane	3	2,550	5,200	18%	17%	B	D
Between South Street & South Street Entrance Ramps	Mainlane	2	2,550	5,200	18%	17%	C	F
Entrance Ramp from South Street	Entrance Ramp	1	450	850	3%	3%	C	F
Between South Street Entrance Ramp & US-67 Exit Ramp	Mainlane	2	3,000	6,050	16%	15%	D	F
Exit Ramp to Highway 67	Exit Ramp	1	950	2,400	6%	2%	D	F
Between Highway 67 Exit & Entrance Ramps	Mainlane	2	2,050	3,650	25%	22%	C	F
Entrance Ramp from Highway 67	Entrance Ramp	1	200	700	0%	1%	C	F
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	2	2,250	4,350	24%	22%	C	F
Exit Ramp to Highway 70	Exit Ramp	1	750	1,800	8%	1%	C	F
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	1,500	2,550	33%	33%	B	C
Entrance Ramp from Highway 70	Entrance Ramp	1	100	50	0%	10%	B	C
West of Highway 70	Mainlane	2	1,600	2,600	32%	33%	B	C

Notes:

1. Assumes that no change is made to the existing Interstate 30 main lanes other than regular maintenance.
2. PHT - Peak Hour Traffic (volumes shown are for only Westbound directions).
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.

Highway 67/Highway 229 Operations

This highly skewed interchange has unique geometry that appears confusing to drivers. At the north side of the interchange, traffic from westbound Interstate 30 exiting to Highway 67/Highway 229 proceeds freely through the intersection, traffic along Highway 229 stops, and traffic from the frontage road encounters a yield condition. The current configuration will operate at an unsatisfactory LOS in 2018 with two of the stop-controlled intersections failing under the proposed traffic volumes. The S. Frontage Road and Highway 67 intersection will operate at LOS F in 2018. Also, in 2018, the two-way stop-controlled intersection of the westbound exit ramp and Highway 229 north of Interstate 30 is expected to exceed capacity. Without improvements, these failing intersections will only worsen in the year of 2038. Intersection LOS are provided in **Tables 3A** and **3B**.

South Street Operations

South Street currently operates with an acceptable LOS between LOS B and LOS D for almost all movements. The future traffic operations at this interchange will be impacted by the low design speed of the curves, the several conflicting left turning movements, and the existing two lane bridge.

Without improvements, the Interstate 30 westbound frontage road at the intersection of W. South Street (north of Interstate 30) will operate at LOS E in 2038. Also, the S. Frontage Road and Leander Street intersection will operate at LOS E in the "No Build" 2038 AM northbound direction. Finally, the southbound movement of the W. South Street and Bell Street intersection will operate at LOS F in the AM and PM of the No Build 2038 design year. Intersection level-of-service provided in **Tables 3A** and **3B**.

Table 3A - NO BUILD - Intersection Level-of-Service - 2018

Year 2018 No Build Intersection LOS for Highway 67 and South Street											
Description	Roadway Element	No Build									
		Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67											
N. Frontage Road/Highway 67	TWSC[2.]			F	F				F	F	
Eastbound Entrance/Exit Ramp and Highway 67											
S. Frontage Road/Highway 67	TWSC	F[1.]					F[1.]				
South Street											
W. Sevier Street/Woodland Drive	TWSC	A[1.]	A[1.]	B	B		A[1.]	A[1.]	B	B	
W. South Street/Bell Street	TWSC	A[1.]			E		A[1.]			D	
N. Frontage Road/W. South Street	TWSC		C					B			
W. Sevier Street/S. Frontage Road	TWSC		C					C			
Leander Street/S. Frontage Road	TWSC			D					C		
W. South Street/Leander Street	TWSC		A[1.]	C	B			A[1.]	C	B	
S. Frontage Road (NB/SB)/Loop curve	TWSC		B[1.]		A[1.]			A[1.]		A[1.]	

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix D for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Table 3B - NO BUILD - Intersection Level-of-Service - 2038

Year 2038 No Build Intersection LOS for Highway 67 and South Street											
Description	Roadway Element	No Build									
		Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67											
N. Frontage Road/Highway 67	TWSC[2.]			F	F				F	F	
Eastbound Entrance/Exit Ramp and Highway 67											
S. Frontage Road/Highway 67	TWSC	F[1.]					F[1.]				
South Street											
W. Sevier Street/Woodland Drive	TWSC	A[1.]	A[1.]	C	C		A[1.]	A[1.]	B	B	
W. South Street/Bell Street	TWSC	A[1.]			F		A[1.]			F	
N. Frontage Road/W. South Street	TWSC		E					C			
W. Sevier Street/S. Frontage Road	TWSC		D					C			
Leander Street/S. Frontage Road	TWSC			E					D		
W. South Street/Leander Street	TWSC		A[1.]	C	B			A[1.]	D	B	
S. Frontage Road (NB/SB)/Loop curve	TWSC		D[1.]		A[1.]			B[1.]		A[1.]	

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix D for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Safety Analysis

Crash data for 2010, 2011, and 2012 was analyzed for Interstate 30 and its major interchanges. Crash types noted in the crash analysis included rear-end, single vehicle, sideswipe, angle, backing, and head-on crashes. The crashes occurring along Interstate 30, Highway 67/229, and W. South Street are presented in **Appendix F**.

The most predominate crash type along Interstate 30, from 2010 to 2012, was the single-vehicle crash followed by the rear-end crash. The most prevalent crash type along Highway 67/229 was the rear-end crash followed by the angle crash (angle crashes are typical at or near intersections). The crashes were concentrated around the main interchanges of Highway 70, Highway 67/229, and W. South Street. The Highway 67/229 westbound exit ramp and the eastbound entrance ramp had the highest concentration of crashes. These two ramps also had two of the largest peak hour ramp volumes. There were many crashes between the South Street overpass and the Highway 67/229 interchange which indicates possibility of queueing between these two interchanges because of capacity limitations.

Interstate 30, between the log miles of 110.88 and 116.23, was analyzed to find the average crash rate between the years of 2010 to 2012 along the project area. Included in the Interstate 30 crash total were crashes that occurred along the entrance and exit ramps that would have affected the traffic on the main lanes. There were 197 crashes along Interstate 30 and its ramps, and 39 crashes along Highway 67/229. Highway 67/229 was analyzed between the log miles of 7.12 to 7.62 for Highway 67 and from log miles 0.0 to 0.50 of Highway 229 to also find the average crash rate. The crash rate of Interstate 30 was compared to the statewide average for total crashes on a four lane divided highway with full-control access (freeways). And Highway 67/229 was compared to the statewide average for total crashes on a two lane undivided highway with no-control of access. Crash rates were calculated for total collisions with all severity types as well as collisions with only fatal (K) and severe injury (A) (KA Crash Rate). The total crash rate and KA crash rate for Interstate 30 along this project is comparable to Arkansas' average crash rate with the concentration of the serious and fatal crashes around the three major interchanges as explained below. The total crash rate for Highway 67/229 exceeded the Arkansas average crash rate. Crash rates for 2010-2012 are provided in **Table 4A**.

Table 4A: Crash Rates for 2010-2012

Corridor	Length (miles)	Average ADT	Number of Crashes		Crash Rate		AR Avg. Crash Rate		Crash Rate / AR Avg. Crash Rate	
			All Severity	KA[3]	(per MVM) All Severity	(per 100 MVM) KA[3]	(per MVM) All Severity Types	(per 100 MVM) KA[3]	(per MVM) All Severity Types	(per 100 MVM) KA[3]
I-30	5.35[1]	55700	197	13	0.60	3.98	0.69	4.32	0.87	0.92
Hwy. 67/229	1.00[2]	13000	39	0	2.74	0.00	1.87	12.57	1.47	0.00

[1]Interstate 30 crashes - Log Mile 110.88 to 116.23

[2]Hwy. 67 crashes - Log Mile 7.12 to 7.62; Hwy. 229 - Log Mile 0.00 to 0.50

[3]K = Fatal crash, A = Serious injury crash

All crashes that led to serious injuries or fatalities within the project limits of Interstate 30 were investigated further. A total of eight serious injury crashes and five fatal crashes were reported during the three year study period as shown on **Table 4B**. Out of total thirteen serious injury and fatal crashes, four are at Hwy 70 interchange, three are at Hwy 67 interchange and three are at South street interchange area. Common reasons for these crashes included: inability to stop in time for slowing traffic; weather or lighting conditions; and driving under the influence of alcohol.

Table 4B: Fatal and Serious Injury Crashes

Year	Injury	Location	Collision Type	Details
2010	Serious	WB west of South Street Overpass	Rear End	Didn't stop in time; Alcohol involved
	Serious	WB east of 114 exit ramp	Single Vehicle	Lost Control; Alcohol involved
	Serious	WB east of 114 exit ramp	Single Vehicle	Avoiding Stopped Traffic
	Serious	WB at 112 MM	Sideswipe	Didn't see other vehicle
	Fatal	WB west of Saline River Bridge	Rear End	Didn't stop in time
	Fatal	EB at Inspection Station	Single Vehicle	Lost Control
2011	Serious	EB South St. Exit Ramp	Single Vehicle	Negotiating Curve
	Serious	EB Hwy. 70 Entrance Ramp	Single Vehicle	Merging at night, lost control
	Serious	EB after Hwy. 70 Overpass	Single Vehicle	Ice
	Fatal	EB Hwy. 70 at 111 MM	Rear End	Didn't stop in time; Alcohol involved
	Fatal	EB South St. Exit Ramp	Angle	Car exiting to ramp through painted gore
2012	Serious	Just East of Hwy. 67 Overpass	Single Vehicle	Lost control; at night and raining
	Fatal	I-30 near 111 Mile Marker	Single Vehicle	Negotiating Curve; at night and raining

ENVIRONMENTAL CONSTRAINTS

An environmental review was conducted to identify any special environmental constraints or conditions that warrant consideration in the planning or design process. Graphics for the preliminary constraints identified for the environmental documentation process are located in **Appendix G**. The review identified: Bernard Holland Park, the Trace/Dodson/Dobbs/McNeil Creeks, the Saline River (and tributaries), the Crouch Cemetery, and Section 4(f) and Section 6(f) properties. Also, protected mussels are found in the Saline River and a Nationwide Permit will be obtained prior to any geotechnical boring in the Saline River. A bald eagle's nest and possible migratory birds need to be identified and confirmed by the Arkansas Game and Fish Commission to see if any restrictions will apply within the project limits. Impacts to these locations should be avoided or minimized as much as practical.

COMPATIBILITY WITH TRANSPORTATION PLANS

Improvements for the Interstate 30 corridor were included in the "Areawide Freeway Study" portion of the *Central Arkansas Regional Transportation Study (CARTS).* Specifically, this document lists the widening of Interstate 30 from four lanes to six lanes between Highway 67 and Sevier Street as a priority level of "intermediate need."

In addition, improvements for Interstate 30 were incorporated into the "*Imagine Central Arkansas" 2040 Long Range Metropolitan Transportation Plan* document published by METROPLAN in December of 2014. This document provides long-range transportation plans for Central Arkansas including many considerations such as population and housing, air quality, and funding sources. This document specifically mentions Interstate 30 from Highway 70 to Sevier Street as one of the current CAP projects on page 184.

COMPLIANCE WITH POLICIES AND ENGINEERING STANDARDS AND COORDINATION

Coordination has been maintained with both local officials and the Federal Highway Administration (FHWA) concerning the development of this project. As part of the early project coordination, a meeting was held on March 25, 2014 to explain the proposed alternatives. Representatives from AHTD, FHWA, Metroplan, City of Benton, City of Haskell, and Connecting Arkansas Program attended the coordination meeting.

Coordination with AHTD's Roadway Design Division and Transportation Planning and Policy Division has been maintained in order to confirm that the proposed improvements prescribed by this project agree with the Department's plan for the Interstate 30 corridor.

DESCRIPTION OF ALTERNATIVES

Two alternatives were considered to improve operations along Interstate 30 and at the Highway 70, Highway 67 and South Street interchanges. The first alternative was the no-build alternative. The second alternative involved widening Interstate 30 to six lanes and reconstructing interchanges at Highway 67 and South Street and a portion of the Highway 70 interchange.

Alternative 1 – No Build

Under this alternative, no changes would be made to the existing highway system. This alternative would incur no costs other than continued maintenance on the existing facility. However, this alternative would not improve traffic operations on either Interstate 30 or the three interchanges at Highway 70, Highway 67 and South Street. For this reason, the no-build alternative will not be considered further.

Build Alternatives

Several alternatives were considered for build condition. Following is a brief description of the initial alternatives considered and then a brief explanation on why they were ruled out at the Highway 67 interchange.

A Single Point Urban Interchange (SPUI) was considered for Highway 67 interchange. In this configuration one signalized intersection controls the traffic operation at the interchange, where opposing left turning movements from the ramps will never cross each other. To accommodate the signals below the interchange, the Interstate 30 will need to be raised significantly and the bridge also needs to be long. The cost is excessive to introduce these changes and also is a reason for not considering this alternative further. Another reason for not considering this alternative is driver's unfamiliarity with SPUI interchanges. The SPUI configuration is still very new in USA.

An interchange with diamond ramp configuration was considered. One of the main challenges of this alternative was providing access to the north frontage road and also maintaining a desired traffic operation. Due to undesirable traffic operation results this alternative was not considered further. A modified version of this alternative with the five ramps was the chosen alternative as described below.

Alternative 2 – Build Condition

The Build Condition alternative includes the modifications to Interstate 30 listed below and as shown on Figure 2. The project plans are shown in **Appendix C**.

- Existing 3 degree curve will be flattened along the main lanes of Interstate 30 westbound entrance ramp from Highway 229/W. South Street.

- Interstate 30 westbound will be widened to three lanes from the South/Sevier Street (Exit 116) to the Highway 70 (Exit 111) exit ramp.
- Interstate 30 westbound (Exit 114) exit ramp to Highway 67/229 will be changed to a two-lane exit-ramp with approximately 1700 foot length to provide adequate space for storage and deceleration. The ramp will be barrier separated from Interstate 30 to improve the safety along Interstate 30. The separating barrier will keep the slow moving ramp traffic away from the high speed Interstate traffic.
- Interstate 30 westbound entrance ramp from northbound Highway 67/229 will be a loop ramp with a long acceleration lane.
- Current Interstate 30 westbound entrance ramp from Highway 67/229 will be reconstructed only to allow traffic from southbound Highway 67/229.
- The new third lane along Interstate 30 westbound will drop at Highway 70 as an exit lane.
- Interstate 30 eastbound will be widened to three lanes from the Highway 70 entrance ramp to the current three lanes at the Sevier/South Street entrance ramp.
- Interstate 30 eastbound exit ramp (Exit 114) to Highway 67/229 will intersect at a signalized intersection. The slip-ramp to the two-way south frontage road will be removed.
- Interstate 30 eastbound entrance ramp from Highway 67/229 will be two lanes and then merge into one lane just before the gore with Interstate 30.
- Interstate 30 eastbound exit ramp to South/Sevier Street (Exit 116) gore will be moved west of the current ramp location and will run parallel to the interstate providing more room for traffic to decelerate before yielding at the south frontage road.
- Interstate 30 eastbound entrance ramp from South/Sevier Street will no longer be the beginning of the third lane in eastbound direction, but will now have a 900 foot acceleration lane and will merge with the widened three lane interstate.

This alternative would include the following modifications to the Highway 67 interchange.

- Two signalized intersections are proposed at the Highway 67/229 interchange, one north of the interstate where the frontage road and westbound exit ramp intersects, and one south of the interstate where the eastbound entrance ramp and exit ramp intersects with Highway 67/229.
- Additional through lanes along Highway 67/229 will be added to improve capacity.
- The current skew angle along Highway 67/229 under the Interstate 30 bridge will be reduced.
- Conflicting left turn movement from northbound Highway 67/229 to westbound north frontage road will be removed.

This alternative would include the following modifications to the South Street interchange.

- The South Street bridge will be increased to four lanes from the existing two lane configuration.
- The design speed for the loop just north of the South Street bridge will be increased.
- A roundabout will be placed where the current north frontage road has a stop sign for the left-turn movement and intersects with South Street.

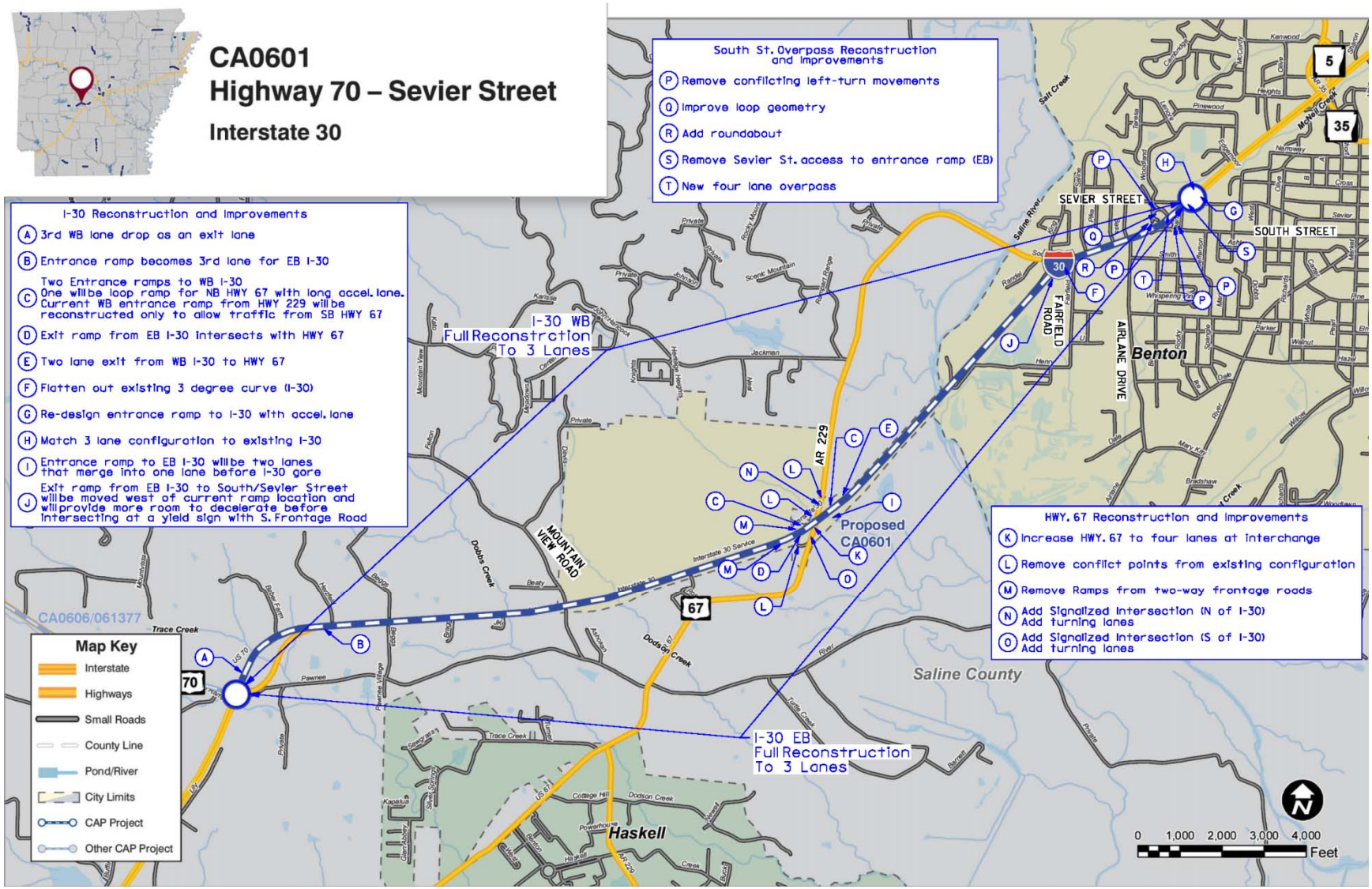
- Several conflicting left turn movements including north frontage road to northbound West South Street, from Bell Street to southbound West South Street, from south frontage road ramp to northbound West South Street and northbound West South Street to south frontage road ramp will be removed.
- Sevier Street access to the eastbound entrance ramp will be removed.

Figure 2 shows the locations of the proposed improvements along Interstate 30 for Alternative 2. Figures 3 to 6 also show the layouts of Highway 70, Highway 67/229, and the South Street interchanges.

CONCEPTUAL SIGNAGE PLAN

A conceptual guide sign exhibit for the proposed alternative is provided in **Appendix H**.

Figure 2 – Job CA0601 - Interstate 30 Project Area



DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	1	4

② INTERCHANGE LAYOUT - HWY. 70

PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED
30M-2	251+68.37	263+73.31	273+18.23	64°29'45"	3°05'00"	1204.93	2149.86	N/A	N/A	N/A
30R-2	2251+80.85	2261+48.49	2269+65.11	55°00'53"	3°00'00"	967.64	1784.26	0.098	420	70 MPH
30R-3	2269+65.11	2272+02.68	2274+39.16	9°28'52"	2°00'00"	237.57	474.05	0.070	350	70 MPH
30L-2	3252+36.65	3263+78.17	3272+73.36	64°29'45"	3°10'00"	1141.52	2036.71	0.098	450 / 540	70 MPH
RI-1	100+00.00	100+90.07	101+80.00	5°24'00"	3°00'00"	90.07	180.00	N/A	N/A	60 MPH ▲
RI-2	101+80.00	102+51.60	103+22.94	8°34'34"	6°00'00"	71.60	142.94	N/A	N/A	50 MPH ▲
RI-3	103+22.94	103+73.58	104+23.85	12°06'34"	12°00'00"	50.64	100.91	N/A	N/A	40 MPH ▲
RI-4	104+23.85	114+71.79	110+50.46	155°05'10"	24°45'00"	1047.95	626.61	0.100	N/A	30 MPH
RI-5	110+50.46	111+73.78	112+91.83	43°09'08"	12°00'00"	123.32	241.37	N/A	N/A	40 MPH ▲
RI-6	112+91.83	116+38.45	119+56.83	39°53'59"	6°00'00"	346.62	664.99	N/A	N/A	N/A
RI-7	120+72.93	121+13.07	121+53.16	4°48'49"	6°00'00"	40.14	80.23	N/A	N/A	N/A
RI-8	121+53.16	122+57.54	123+61.23	11°26'78"	5°30'00"	104.38	208.07	N/A	N/A	N/A
RI-9	123+61.23	124+06.20	124+51.06	6°57'42"	7°45'00"	44.91	89.83	N/A	N/A	N/A
RI-10	126+48.29	127+91.59	129+33.26	14°57'40"	5°15'00"	143.30	284.98	N/A	N/A	N/A

▲ REFER TO RAMP 1 PLAN & PROFILE FOR S.E. TRANSITION DETAILS

EB I-30 STA. 2252+57.88, 28.50' RT. =
C.L. RAMP 1 STA. 100+00.00

WB I-30 STA. 3262+70.99, 38.00' LT. =
C.L. RAMP 3 STA. 325+01.54, 7.5' RT.

WB I-30 STA. 3268+67.70, 28.50' LT. =
C.L. RAMP 3 STA. 331+11.00

EB I-30 STA. 2255+75.47, 40.00' RT. =
C.L. RAMP 1 STA. 102+62.46, 7.5' LT.

EB I-30 STA. 2276+56.13, 26.00' RT. =
C.L. RAMP 2 STA. 242+49.51, 7.5' LT.

EB I-30 STA. 2279+81.30, 29.00' RT. =
C.L. RAMP 2 STA. 245+74.37

C.L. I-30 MEDIAN STA. 248+88.06
BEGIN JOB CA0601
LOG MILE 110.88

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED
R2-1	203+00.00	204+85.93	206+69.79	14°47'30"	4°00'00"	185.93	369.79	N/A	N/A	N/A
R2-2	207+63.33	210+03.40	212+36.62	23°39'52"	5°00'00"	240.07	473.29	N/A	N/A	N/A
R2-3	214+12.64	220+81.10	225+79.05	69°59'03"	6°00'00"	668.45	1166.40	N/A	N/A	N/A
R2-4	228+73.56	234+45.83	239+04.67	61°52'01"	6°00'00"	572.27	1031.12	0.070	250	40 MPH
R2-5	241+49.82	243+62.15	245+74.37	3°11'03"	0°45'00"	212.33	424.55	N/A	N/A	50 MPH
R3-1	305+48.44	310+75.64	315+11.85	57°48'16"	6°00'00"	527.20	963.41	0.092	350	50 MPH
R3-2	321+26.08	324+64.57	327+92.30	24°59'01"	3°45'00"	338.49	666.23	0.098	400	65 MPH
R3-3	327+92.30	329+46.30	331+00.00	6°09'14"	2°00'00"	153.99	307.69	0.098	N/A	70 MPH
FB-1	13+71.69	15+29.44	16+86.07	11°47'22"	3°45'00"	157.75	314.39	0.049	200	40 MPH
FB-2	16+86.07	17+82.36	18+78.60	3°22'09"	1°45'00"	96.29	192.53	0.025	200	40 MPH
FB-3	18+78.60	19+39.32	20+00.00	3°20'19"	2°45'00"	60.72	121.40	N/A	N/A	N/A

FIGURE 3
INTERCHANGE LAYOUT
HWY. 70
PAGE 21

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PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	2	4

(2) INTERCHANGE LAYOUT - HWY. 67

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED
30M-4	381+02.09	396+53.01	411+31.35	30°17'33"	1°00'00"	1550.93	3029.26	0.037	700/900	70 MPH
RI-1	100+00.00	100+75.02	101+50.00	3°00'00"	2°00'00"	75.02	150.00	N/A	N/A	N/A
RI-2	104+18.43	106+56.35	108+93.42	8°18'45"	1°45'00"	237.91	474.99	0.037	300	50 MPH
R2-1	200+29.87	201+57.64	202+82.07	22°41'53"	9°00'00"	127.78	252.20	N/A	N/A	N/A
R3-1	303+51.71	306+46.75	308+96.62	54°29'26"	10°00'00"	295.03	544.91	0.094	375/300	40 MPH
R3-2	317+40.15	319+40.23	321+40.15	4°00'00"	1°00'00"	200.08	400.00	N/A	N/A	50 MPH
R3-3	323+36.99	324+37.03	325+36.99	4°00'00"	2°00'00"	100.04	200.00	N/A	N/A	N/A
R4-1	400+00.00	401+50.51	403+00.75	6°00'54"	2°00'00"	150.51	300.75	0.037	N/A	50 MPH
R4-2	405+08.37	406+84.10	408+08.99	74°24'18"	24°45'00"	175.73	300.63	0.100	300	30 MPH
R4-3	408+08.99	410+75.56	411+08.51	125°47'50"	42°00'00"	266.57	299.52	0.100	200	25 MPH ▲
R4-4	411+08.51	411+59.11	412+08.15	24°39'39"	24°45'00"	50.60	99.64	N/A	N/A	30 MPH ▲
R5-1	500+00.00	501+17.52	502+34.74	7°02'32"	3°00'00"	117.52	234.74	0.057	300	50 MPH
R5-2	508+34.63	512+97.14	517+56.54	11°31'26"	1°15'00"	462.51	921.90	0.026	300	50 MPH
R5-3	517+56.54	518+81.81	519+92.72	47°14'09"	20°00'00"	125.27	236.19	0.060	200	30 MPH ▲

▲ SUPERELEVATION BASED ON 2004 GREEN BOOK EXHIBIT 3-26 (e_{max} = 6%)

C.L. I-30 MEDIAN STA. 378+57.46, 53.50' LT. =
C.L. RAMP 5 STA. 500+00.00

C.L. I-30 MEDIAN STA. 380+22.97, 53.16' LT. =
C.L. RAMP 5 STA. 501+65.08, 7.5' RT.

C.L. HWY. 67 STA. 525+90.53, 36.50' LT. =
C.L. RAMP 5 STA. 519+92.72

C.L. I-30 MEDIAN STA. 395+94.50, 54.17' LT. =
C.L. RAMP 4 STA. 400+00.00

C.L. I-30 MEDIAN
STA. 377+58.75, 41.50' RT. =
C.L. RAMP 1 STA. 100+00.00

C.L. I-30 MEDIAN STA. 398+80.05, 52.00' LT. =
C.L. RAMP 4 STA. 402+82.39, 7.50' RT.

C.L. I-30 MEDIAN STA. 385+51.27, 63.00' RT. =
C.L. RAMP 1 STA. 107+98.42. 7.5' LT.

C.L. HWY. 67 STA. 528+00.00, 36.50' RT. =
C.L. RAMP 4 STA. 412+08.15

C.L. HWY. 67 STA. 530+51.31 =
C.L. RAMP 3 STA. 300+00.00 =
∠ = 85°36'50"
C.L. FRONTAGE ROAD B STA. 80+00.00
∠ = 94°23'10"

C.L. HWY. 67 STA. 515+40.46 =
C.L. FRONTAGE ROAD A STA. 45+00.00
∠ = 90°00'00"

C.L. HWY. 67 STA. 520+99.90 =
C.L. RAMP 1 STA. 118+32.96 =
C.L. RAMP 2 STA. 200+00.00
∠ = 60°29'22"

C.L. HWY. 67 STA. 522+98.42 =
C.L. I-30 MEDIAN STA. 396+88.28
∠ = 49°56'24"

C.L. RAMP 4 STA. 401+40.04 =
C.L. HWY. 67 STA. 523+71.66
∠ = 48°5'20"

C.L. I-30 MEDIAN STA. 419+44.83, 65.67' LT. =
C.L. RAMP 3 STA. 318+49.16, 12.00' LT.

C.L. I-30 MEDIAN STA. 426+31.82, 49.00' LT. =
C.L. RAMP 3 STA. 325+36.99

C.L. I-30 MEDIAN
STA. 406+23.14, 52.00' RT. =
C.L. RAMP 2 STA 210+89.11. 7.5' LT.

C.L. I-30 MEDIAN
STA. 409+03.14, 54.17' RT. =
C.L. RAMP 2 STA. 213+71.52

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED
FA-1	33+15.64	34+86.62	36+57.36	5°07'33"	1°30'00"	170.98	341.72	0.021	200	40 MPH
FA-2	38+76.93	40+96.86	42+56.97	72°12'30"	19°00'00"	219.93	380.04	0.095	250	30 MPH
FA-3	43+55.66	44+07.19	44+56.32	30°11'55"	30°00'00"	51.53	100.66	N/A	N/A	25 MPH ○
FB-4	54+55.99	55+78.44	57+00.56	7°20'14"	3°00'00"	122.45	244.57	0.040	200	40 MPH
FB-5	62+66.67	65+26.77	67+54.99	48°49'56"	10°00'00"	260.10	488.32	0.094	250	40 MPH
FB-6	72+62.14	75+63.00	77+62.59	80°04'21"	16°00'00"	300.87	500.45	0.089	250	30 MPH
67-2	502+79.96	505+75.37	508+25.46	54°32'59"	10°00'00"	295.41	545.50	0.068	250	30 MPH ◪
67-3	513+30.89	516+88.52	520+40.42	17°44'18"	2°30'00"	357.62	709.53	0.067	360/600	60 MPH
67-4	528+00.68	530+01.74	532+02.29	7°01'41"	1°45'00"	201.05	401.60	0.049	675/575	60 MPH
67-5	537+52.64	538+54.30	539+55.83	5°04'05"	2°30'00"	101.66	203.19	0.067	300	60 MPH
67R-1	520+47.27	521+15.68	521+80.51	31°58'38"	24°00'00"	68.41	133.24	N/A	N/A	N/A

▲ SUPERELEVATION BASED ON 2004 GREEN BOOK EXHIBIT 3-26 (e_{max} = 6%)
○ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = -2%)
◪ MATCHES EXISTING CURVE S.E. LT. LANE 0.066 '/' TO 0.076 '/'
RT. LANE 0.025 '/' TO 0.048 '/'

FIGURE 4
INTERCHANGE LAYOUT
HWY. 67
PAGE 22

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	3	4

(2) INTERCHANGE LAYOUT - SOUTH ST.

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED
30M-5	471+69.23	481+89.06	491+67.24	28°18'18"	1°25'00"	1019.83	1998.01	0.054	420	70 MPH
RI-1	100+00.00	100+58.35	101+16.67	3°30'00"	3°00'00"	58.35	116.67	N/A	N/A	N/A
RI-2	105+11.18	106+86.23	108+61.18	3°30'00"	1°00'00"	175.05	350.00	N.C.	N/A	40 MPH
RI-3	111+87.41	113+15.76	114+44.07	2°34'00"	1°00'00"	128.35	256.65	N.C.	N/A	40 MPH
RI-4	117+65.66	118+35.83	118+91.59	62°57'41"	50°00'00"	70.17	125.92	0.040	85	20 MPH ▲
R4-1	400+00.00	401+78.56	403+57.09	1°47'08"	30'00"	178.56	357.09	N.C.	N/A	60 MPH
R4-2	411+05.50	412+44.53	413+83.34	5°33'24"	2°00'00"	139.03	277.84	0.028	175	40 MPH
AR-1	10+17.57	10+95.05	11+66.58	38°44'33"	26°00'00"	77.48	149.01	N/A	N/A	N/A
FC-1	87+55.64	89+13.10	90+58.10	39°19'10"	13°00'00"	157.46	302.46	0.100	250	40 MPH
FC-2	94+38.40	98+24.69	102+07.42	13°27'29"	1°45'00"	386.29	769.02	0.025	200	40 MPH
FD-1	126+52.18	127+52.07	128+48.39	26°29'17"	13°30'00"	99.89	196.21	N/A	N/A	N/A
XF-1	5+93.09	6+87.88	7+76.09	34°36'53"	19°00'00"	93.97	182.18	N.C.	N/A	25 MPH ○

○ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = -2%)
▲ SUPERELEVATION BASED ON 2004 GREEN BOOK EXHIBIT 3-26 (e_{max} = 4%)

C.L. I-30 MEDIAN STA. 471+35.88, 51.00' LT. =
C.L. RAMP 4 STA. 404+01.35, 7.5' RT.

C.L. I-30 MEDIAN STA. 467+34.61, 54.00' LT. =
C.L. RAMP 4 STA. 400+00.00

C.L. RAMP 4 STA. 413+80.99 =
C.L. HWY. 229 STA. 10+05.50
∠ = 89°57'11"

C.L. I-30 MEDIAN STA. 457+02.36, 42.00' RT. =
C.L. RAMP 1 STA. 100+00.00

C.L. I-30 MEDIAN STA. 463+37.96, 63.00' RT. =
C.L. RAMP 1 STA. 106+36.08, 7.5' LT.

C.L. FRONTAGE ROAD C STA. 86+92.60 =
C.L. SOUTH ST. RAMP 1 STA. 119+40.16
∠ = 90°0'0"

C.L. FRONTAGE ROAD C STA. 94+03.72 =
C.L. FAIRFIELD RD. STA. 8+00.00
∠ = 90°26'33"

W. SOUTH ST. (HWY. 229)
TROUTT
RAMP 4
RAMP 1
FRONTAGE ROAD D
FRONTAGE ROAD C
FAIRFIELD RD.
100-YR. FLOODPLAIN
EXIST. R/W
EXIST. R/W & C/A
PROP. R/W & C/A
C.L. I-30 MEDIAN
CRASH ATTENUATOR
750' ACCELERATION LANE
300' TAPER
60° CURVE
85° CURVE
75' R
50' R
N82°10'22"W
N46°34'11"E
N41°0'46"E
N42°47'54"E
N46°17'54"E
N45°21'54"E
N57°38'44"E
N71°6'13"E
N18°19'34"E
N2°42'10"E
AR-1
R4-1
R4-2
30M-5
RI-1
RI-2
RI-3
RI-4
FC-1
FC-2
FD-1
XF-1
P.C.
P.I.
P.T.

FIGURE 5
INTERCHANGE LAYOUT
SOUTH ST. (1 OF 2)
PAGE 23

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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	4	4

(2) INTERCHANGE LAYOUT - SOUTH ST.

PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED	
XR-1	65+00.00	N/A	68+49.42	360°00'00"	98°47'09"	N/A	364.42	N.C.	N/A	16 MPH	○
XS-1	20+64.74	30+57.91	26+24.44	156°42'58"	28°00'00"	993.17	559.70	N.C.	N/A	24 MPH	○
XS-2	29+92.11	31+75.39	33+36.74	48°14'56"	14°00'00"	183.28	344.63	N.C.	N/A	30 MPH	○
RA-1	70+00.00	71+22.66	72+38.34	33°22'04"	14°00'00"	122.66	238.34	N.C.	N/A	35 MPH	◥
RB-1	80+00.00	80+95.65	81+54.75	85°06'54"	55°00'00"	95.65	154.75	N.C.	N/A	20 MPH	◥
RB-2	83+19.27	83+42.71	83+66.05	9°21'22"	20°00'00"	23.44	46.78	N.C.	N/A	27 MPH	○
RB-3	84+12.98	84+74.26	85+25.53	56°16'27"	50°00'00"	61.28	112.55	N.C.	N/A	20 MPH	◥
XL-1	62+37.25	63+12.26	63+76.45	52°53'43"	38°00'00"	75.00	139.20	N.C.	N/A	21 MPH	○
RC-1	90+00.00	91+39.31	91+70.18	119°07'41"	70°00'00"	139.31	170.18	N.C.	N/A	18 MPH	◥
RC-2	91+70.18	92+13.50	92+54.87	29°38'32"	35°00'00"	43.32	84.69	N.C.	N/A	24 MPH	◥
RC-3	92+54.87	93+87.54	94+21.52	116°39'07"	70°00'00"	132.66	166.65	N.C.	N/A	18 MPH	◥
RD-1	95+00.00	N/A	99+09.20	271°05'53"	66°15'00"	86.48	409.20	N.C.	N/A	19 MPH	◥
XB-1	40+48.44	41+00.08	41+50.62	20°26'15"	20°00'00"	51.64	102.19	N.C.	N/A	27 MPH	○

○ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = -2%)
◥ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = +2%)

C.L. BELL ST. STA. 40+00.00 =
C.L. SOUTH ST. STA. 23+74.41
∠ = 90°00'00"

C.L. SOUTH ST. STA. 20+00.00 =
C.L. FRTG. RD. D STA. 149+61.21

C.L. BELL ST. STA. 41+82.80 =
C.L. SEVIER ST. STA. 51+72.94
∠ = 88°32'57"

C.L. SEVIER ST. STA. 58+00.00 =
C.L. FRTG. RD. D STA. 158+20.30
∠ = 40°05'01"

C.L. FRONTAGE ROAD C STA. 109+53.44 =
C.L. AIRLANE DR. STA. 5+00.00
∠ = 110°5'32"

C.L. LEANDER ST. STA. 60+00.00 =
C.L. SOUTH ST. STA. 32+27.24
∠ = 106°20'09"

EB I-30 STA. 2524+57.15, 40.50' RT. =
C.L. RAMP 2 STA. 212+61.38

EB I-30 STA. 2521+75.78, 39.90' RT. =
C.L. RAMP 2 STA. 209+79.90, 7.5' LT.

CURVE DATA

CURVE	P.C. (P.C.C.)	P.I.	P.T. (P.C.C.)	DELTA	DOC	TANGENT FEET	LENGTH FEET	e FT./FT.	Ls FEET	DESIGN SPEED	
30M-6	498+10.03	503+67.34	509+14.15	19°14'44"	1°44'35"	557.31	1104.12	N/A	N/A	N/A	
30L-3	3498+10.03	3503+65.13	3509+09.78	19°14'44"	1°45'00"	551.11	1099.75	0.062	420	70 MPH	
30R-4	2498+99.32	2503+93.61	2508+78.27	19°34'44"	2°00'00"	494.29	978.95	0.070	420	70 MPH	
R2-1	200+59.64	202+73.97	204+88.10	4°17'05"	1°00'00"	214.33	428.46	N.C.	N/A	40 MPH	
R2-2	209+44.11	211+02.79	212+61.38	3°10'22"	1°00'00"	158.68	317.27	0.021	200	50 MPH	
FC-3	109+88.20	114+49.62	119+03.18	18°17'59"	2°00'00"	461.42	914.98	0.028	200	40 MPH	
FD-2	142+33.79	144+53.10	146+71.56	8°45'20"	2°00'00"	219.32	437.78	MATCH. EXIST.	MATCH. EXIST.	N/A	
FD-3	146+71.56	147+44.63	148+15.95	21°39'30"	15°00'00"	73.07	144.39	N.C.	N/A	30 MPH	○
FD-4	150+48.87	150+80.75	151+12.42	11°26'23"	18°00'00"	31.88	63.55	N.C.	N/A	30 MPH	◥
FD-5	151+12.42	151+72.47	152+32.16	10°46'34"	9°00'00"	60.04	119.73	N.C.	N/A	40 MPH	◥
FD-6	152+32.16	153+00.95	153+69.60	6°11'06"	4°30'00"	68.79	137.44	N.C.	N/A	40 MPH	▲
FD-7	153+69.60	154+35.56	155+01.49	2°58'02"	2°15'00"	65.96	131.88	N.C.	N/A	40 MPH	▲

○ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = -2%)
◥ DESIGN SPEED BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = +2%)
▲ DESIGN SPEED EXCEEDS 40 MPH BASED ON 2004 GREEN BOOK EXHIBIT 3-16 (e = +2%)

FIGURE 6
INTERCHANGE LAYOUT
SOUTH ST. (2 OF 2)
PAGE 24

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ANALYSIS OF CONSTRUCTION ALTERNATIVE

The proposed six-lane Interstate 30 and the two reconstructed interchanges at Exit 114 and Exit 116 were examined from both an operational and a safety standpoint. Impacts to Highway 67, South Street, and Interstate 30 were considered. Daily peak hour traffic volumes anticipated under the build alternative are shown in **Tables 5A**, **5B**, **6A**, and **6B**.

Operational Analysis

The HCM was used to analyze the impacts of the proposed interchange improvements on Interstate 30 traffic. The results of the analysis are presented in **Tables 5A**, **5B**, **6A**, and **6B**. To compare the traffic operation between the build and no-build alternatives along different segments of the corridor for both the opening year 2018 and design year 2038, LOS results from both alternatives are presented in **Tables 7A**, **7B**, **8A** and **8B**. The stick diagrams titled "Build Alternative" in **Appendix B** also show the peak hour traffic volumes and the level-of-service along with the sketch level geometry of the proposed six lanes interstate.

The various HCM freeway facility methodologies were used to measure the effectiveness of the improvements on freeway operations. The HCM analysis required a few basic assumptions for factors such as FFS (Free Flow Speed), Terrain (Level, Rolling, or Mountainous), PHF (peak hour factor) and fp (driver population adjustment). FFS was measured for each main lane basic segment, based on total-ramp-density, lateral clearances, and lane widths, and applied not only to the basic segments but also to the ramp segments directly downstream of the basic segment. Total-ramp-density (TRD) is defined as the number of entrance ramp, exit-ramp, major merge, and major diverge junctions per mile. It applies to a 6-mile segment of freeway facility, 3 miles upstream and 3 miles downstream of the midpoint of the study segment. Terrain, for the main lanes, was defined according to the Highway Capacity Manual 2010 in Chapter 11 pages 11-14 to 11-17. Terrain definition adds an adjustment factor to the truck percentage in the calculation of LOS according to the Highway Capacity Manual 2010. A PHF of 0.96 was assumed for the typical urban peak-hour freeway conditions experienced along Interstate 30, as well as the rest of the project. A f_p of 0.95 was assumed to account for the mixture of commuters who are familiar with the highway segment and tourists heading towards Hot Springs who are less familiar with the area. The truck percentages along the main lanes and ramps were based on the available data in the "CAP Traffic Report", and are shown in **Tables 5A - 6B.** Truck percentages were assumed to be 5% at Highway 67/229 and W. South Street interchanges as the "CAP Traffic Report" did not include truck percentages outside of the Interstate 30 main lanes and ramps. In general, the main lanes LOS for build scenarios improved over no build scenarios in both the AM/PM peak hours by one LOS level. Major anticipated traffic operation improvements are explained below.

Interstate 30 Operations

Eastbound Operation

The eastbound lanes in the existing two lane configuration would operate at LOS E from the Highway 70 entrance ramp to the Highway 67 exit ramp in the year 2038. The addition of a third lane to this section will cause it to operate at LOS C in the peak hour of this same section for the 2038 design year of the "Build" alternative. The existing section between the Highway 67 entrance ramp up to the segment between the South Street exit and entrance ramps will operate at LOS F in the year 2038. In the 3 lane "Build" alternative the section between the Highway 67 entrance ramp and the South Street Exit ramp will operate at LOS D in the peak hour and at LOS C between the South Street ramps in the 2038 design year. In the existing condition Interstate 30 eastbound entrance ramp from South/Sevier Street becomes the third lane of the Interstate. In the proposed condition this ramp will merge into the three lanes of Interstate 30. Traffic operation of this ramp and the segment of the Interstate 30 up to the next exit ramp to Highway 5 will slightly deteriorate in the proposed condition due to the influence area of the merging operation coincides with the influence area for the exit ramp to Highway 5. Eastbound Interstate 30 LOS results are provided in **Tables 5A, 6A, 7A and 8A.** The HCS 2010 reports are located in **Appendix E**.

Westbound Operation

If the existing interstate configuration would be kept though the year 2038, the westbound two main lanes would operate at an LOS F from the segment between the South Street ramps to the Highway 67 exit ramp. Also, the Highway 67 entrance ramp to the Highway 70 exit ramp would operate at LOS F in the year 2038. In the "Build" alternative the segment between the South Street ramps would operate at LOS D in the 2038 design year. The South Street entrance ramp as well as the segment between the South Street entrance ramp and the Highway 67/229 exit ramp will operate at LOS E in the design year. The segment between South Street entrance ramp and the Highway 67/229 exit ramp of the Interstate 30 can be widened to accommodate an auxiliary lane if warranted in future. The proposed two-lane exit ramp to Highway 67/229 will operate at LOS C as well as both entrance ramps from Highway 67/229 in 2038. Finally the segment between the furthest west entrance ramp from Highway 67/229 and the exit lane to Highway 70 will operate at LOS D in the 2038 design year as compared to the LOS F in the "No Build" year 2038. Westbound Interstate 30 LOS results are provided in **Tables 5B, 6B, 7B and 8B.** The HCS 2010 reports are located in **Appendix E**.

Table 5A - BUILD - Eastbound Peak Hour Traffic Volumes and Level-of-Service - Opening Year 2018

Year 2018 Build [1.] for Interstate 30 Eastbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT [2.]		Truck [4.] Percent		Main Lane or Ramp LOS [5.]	
			AM [3.]	PM [3.]	AM	PM	AM	PM
West of Highway 70	Mainlane	2	1,300	1,400	26%	39%	A	B
Exit Lane to Highway 70	Exit Lane	1	40	100	0%	22%	B	B
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	1,260	1,300	26%	39%	A	B
Entrance Ramp from Highway 70	Entrance Ramp [6.]	1	910	710	3%	5%	B	B
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	3	2,170	2,010	17%	28%	B	B
Exit Ramp to Highway 67	Exit Ramp	1	200	400	0%	2%	B	B
Between Highway 67 Exit & Entrance Ramps	Mainlane	3	1,970	1,610	18%	29%	B	A
Entrance Ramp from Highway 67	Entrance Ramp	1	1,600	1,200	1%	3%	C	B
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	3	3,570	2,810	12%	22%	C	B
Exit Ramp to South Street	Exit Ramp	1	350	250	38%	36%	C	C
Between South Street Exit & Entrance Ramps	Mainlane	3	3,220	2,560	9%	21%	B	B
Entrance Ramp from South Street	Entrance Ramp	1	880	675	8%	3%	C	C
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane [7.]	3	4,100	3,235	10%	18%	D	C
Exit Ramp to Highway 5	Exit Ramp	1	700	750	1%	1%	D	C
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	3,400	2,485	8%	23%	C	B

Notes:

1. Assumes that Interstate 30 is widened to 3 lanes east of the Highway 70 single lane-addition entrance ramp to the South/Sevier Street entrance ramp.
2. PHT - Peak Hour Traffic (volumes shown are for only Eastbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. Entrance Ramp is actually a lane addition and LOS is modeled as a basic section per HCM 2010
7. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.

Table 5B - BUILD - Westbound Peak Hour Traffic Volumes and Level-of-Service - Opening Year 2018

Year 2018 Build [1.] for I-30 Westbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT [2.]		Truck [4.] Percent		Main Lane or Ramp LOS [5.]	
			AM [3.]	PM [3.]	AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	1,820	3,610	19%	17%	A	C
Entrance Ramp from Highway 5	Entrance Ramp	1	300	500	1%	0%	B	C
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane [6.]	3	2,120	4,110	16%	15%	B	D
Exit Ramp to South Street	Exit Ramp	1	400	450	6%	3%	B	D
Between South Street Exit & South Street Entrance Ramp	Mainlane	3	1,720	3,660	18%	17%	A	C
Entrance Ramp from South Street	Entrance Ramp	1	250	500	3%	3%	B	C
Between South Street Entrance Ramp & Highway 67 Exit Ramp	Mainlane	3	1,970	4,160	16%	15%	B	C
Exit Ramp to Highway 67	Exit Ramp	2	700	1,800	6%	2%	A	B
Between Highway 67 Exit & Entrance Ramps	Mainlane	3	1,270	2,360	25%	22%	A	B
Entrance Ramp from Highway 67	Entrance Ramp	1	75	225	0%	1%	A	B
Between Highway 67 Entrance Ramps	Mainlane	3	1,345	2,585	24%	22%	A	B
Entrance Ramp from Highway 67	Entrance Ramp [7.]	1	25	175	0%	1%	A	B
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	3	1,370	2,760	24%	22%	A	B
Exit Ramp to Highway 70	Exit Ramp [8.]	1	460	1,100	8%	1%	A	B
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	910	1,660	33%	33%	A	B
Entrance Ramp from Highway 70	Entrance Ramp	1	90	40	0%	10%	A	B
West of Highway 70	Mainlane	2	1,000	1,700	32%	33%	A	B

Notes:

1. Assumes that Interstate 30 is widened to 3 lanes west of the South/Sevier Street exit ramp to the Highway 70 exit-only ramp (with a proposed two-lane exit ramp at Highway 67/Highway 229).
2. PHT - Peak Hour Traffic (volumes shown are for only Westbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.
7. Entrance Ramp is actually a weaving section with the rarely used Inspection Station and LOS is modeled as a weaving section.
8. Exit Ramp is actually a lane drop and LOS is modeled as a basic section.

Table 6A - BUILD - Eastbound Peak Hour Traffic Volumes and Level-of-Service - Design Year 2038

Year 2038 Build [1.] for Interstate 30 Eastbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT [2.]		Truck [4.] Percent		Main Lane or Ramp LOS [5.]	
			AM [3.]	PM [3.]	AM	PM	AM	PM
West of Highway 70	Mainlane	2	2,070	2,470	26%	39%	B	C
Exit Lane to Highway 70	Exit Lane	1	70	200	0%	22%	C	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	2,000	2,270	26%	39%	B	C
Entrance Ramp from Highway 70	Entrance Ramp [6.]	1	1,500	1,250	3%	5%	C	C
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	3	3,500	3,520	17%	28%	C	C
Exit Ramp to Highway 67	Exit Ramp	1	350	750	0%	2%	C	C
Between Highway 67 Exit & Entrance Ramps	Mainlane	3	3,150	2,770	18%	29%	B	B
Entrance Ramp from Highway 67	Entrance Ramp	1	1,900	1,700	1%	3%	D	D
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	3	5,050	4,470	12%	22%	D	D
Exit Ramp to South Street	Exit Ramp	1	600	450	38%	36%	D	D
Between South Street Exit & Entrance Ramps	Mainlane	3	4,450	4,020	9%	21%	C	C
Entrance Ramp from South Street	Entrance Ramp	1	1,050	920	8%	3%	E	D
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane [7.]	3	5,500	4,940	10%	18%	E	E
Exit Ramp to Highway 5	Exit Ramp	1	1,000	1,100	1%	1%	E	E
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	4,500	3,840	8%	23%	C	C

Notes:

1. Assumes that Interstate 30 is widened to 3 lanes east of the Highway 70 single lane-addition entrance ramp to the South/Sevier Street entrance ramp.
2. PHT - Peak Hour Traffic (volumes shown are for only Eastbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. Entrance Ramp is actually a lane addition and LOS is modeled as a basic section per HCM 2010
7. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.

Table 6B - BUILD - Westbound Peak Hour Traffic Volumes and Level-of-Service - Design Year 2038

Year 2038 Build [1.] for Interstate 30 Westbound Main Lanes and Ramps Peak Traffic Operations								
Description	Roadway Element	Number of Lanes	PHT [2.]		Truck [4.] Percent		Main Lane or Ramp LOS [5.]	
			AM [3.]	PM [3.]	AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	3	2,550	4,950	19%	17%	B	D
Entrance Ramp from Highway 5	Entrance Ramp	1	450	750	1%	0%	B	D
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane [6.]	3	3,000	5,700	16%	15%	C	E
Exit Ramp to South Street	Exit Ramp	1	450	500	6%	3%	C	E
Between South Street Exit & South Street Entrance Ramp	Mainlane	3	2,550	5,200	18%	17%	B	D
Entrance Ramp from South Street	Entrance Ramp	1	450	850	3%	3%	B	E
Between South Street Entrance Ramp & Highway 67 Exit Ramp	Mainlane	3	3,000	6,050	16%	15%	B	E
Exit Ramp to Highway 67	Exit Ramp	2	950	2,400	6%	2%	A	C
Between Highway 67 Exit & Entrance Ramps	Mainlane	3	2,050	3,650	25%	22%	B	D
Entrance Ramp from Highway 67	Entrance Ramp	1	150	400	0%	1%	B	C
Between Highway 67 Entrance Ramps	Mainlane	3	2,200	4,050	24%	22%	B	D
Entrance Ramp from Highway 67	Entrance Ramp [7.]	1	50	300	0%	1%	B	C
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	3	2,250	4,350	24%	22%	B	D
Exit Ramp to Highway 70	Exit Ramp [8.]	1	750	1,800	8%	1%	B	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	2	1,500	2,550	33%	33%	B	C
Entrance Ramp from Highway 70	Entrance Ramp	1	100	50	0%	10%	B	C
West of Highway 70	Mainlane	2	1,600	2,600	32%	33%	B	C

Notes:

1. Assumes that Interstate 30 is widened to 3 lanes west of the South/Sevier St. exit ramp to the Highway 70 exit-only ramp (with a proposed two-lane exit ramp at Highway 67/Highway 229).
2. PHT - Peak Hour Traffic (volumes shown are for only Westbound directions)
3. AM/PM peak hour volumes are calculated from the AM/PM peak hour volumes given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
4. Truck Percents are calculated from the values given in the "Connecting Arkansas Program (CAP), Traffic Count Plan, Traffic Projection Plan and Traffic Forecast, CA0601 - I-30 Widening, Highway 70 - Sevier Street," May 6, 2014.
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for main lanes and ramps and implemented by the Highway Capacity Software (HCS 2010 by McTrans).
6. The Mainlane segment is an overlapping region between the adjacent ramp influence areas and the worst LOS from these ramps is recorded, per HCM 2010. No separate analysis was conducted for this segment.
7. Entrance Ramp is actually a weaving section with the rarely used Inspection Station and LOS is modeled as a weaving section.
8. Exit Ramp is a lane drop and LOS is modeled as a basic section per HCM 2010.

Table 7A - NO BUILD/BUILD - Eastbound Level-of-Service - Opening Year 2018

Year 2018 No-Build/Build for Interstate 30 Eastbound Main Lanes and Ramps LOS					
Description	Roadway Element	No Build		Build	
		Main Lane or Ramp LOS		Main Lane or Ramp LOS	
		AM	PM	AM	PM
West of Highway 70	Mainlane	A	B	A	B
Exit Ramp to Highway 70	Exit Ramp	B	B	B	B
Between Highway 70 Exit & Entrance Ramps	Mainlane	A	B	A	B
Entrance Ramp from Highway 70	Entrance Ramp	C	B	B	B
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	B	B	B	B
Exit Ramp to Highway 67	Exit Ramp	C	C	B	B
Between Highway 67 Exit & Entrance Ramps	Mainlane	B	B	B	A
Entrance Ramp from Highway 67	Entrance Ramp	D	C	C	B
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	D	C	C	B
Exit Ramp to South Street	Exit Ramp	D	D	C	C
Between South Street Exit & Entrance Ramps	Mainlane	D	C	B	B
Entrance Ramp from South Street	Entrance Ramp	C	C	C	C
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane	C	C	D	C
Exit Ramp to Highway 5	Exit Ramp	D	C	D	C
Between Highway 5 Exit & Entrance Ramps	Mainlane	C	B	C	B

Table 7B - NO BUILD/BUILD - Westbound Level-of-Service - Opening Year 2018

Year 2018 No Build/Build for Interstate 30 Westbound Main Lanes and Ramps LOS					
Description	Roadway Element	No Build		Build	
		Main Lane or Ramp LOS		Main Lane or Ramp LOS	
		AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	A	C	A	C
Entrance Ramp from Highway 5	Entrance Ramp	B	C	B	C
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane	B	D	B	D
Exit Ramp to South Street	Exit Ramp	B	D	B	D
Between South Street Exit & South Street Overpass	Mainlane	A	C	A	C
Between South Street & South Street Entrance Ramps	Mainlane	B	E	A	C
Entrance Ramp from South Street	Entrance Ramp	B	F	B	C
Between South Street Entrance Ramp & Highway 67 Exit Ramp	Mainlane	B	F	B	C
Exit Ramp to Highway 67	Exit Ramp	C	F	A	B
Between Highway 67 Exit & Entrance Ramps	Mainlane	B	C	A	B
Entrance Ramp from Highway 67	Entrance Ramp	B	D	A	B
Between Highway 67 Entrance Ramps	Mainlane			A	B
Entrance Ramp from Highway 67	Entrance Ramp			A	B
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	B	C	A	B
Exit Ramp to Highway 70	Exit Ramp	B	D	A	B
Between Highway 70 Exit & Entrance Ramps	Mainlane	A	B	A	B
Entrance Ramp from Highway 70	Entrance Ramp	A	B	A	B
West of Highway 70	Mainlane	A	B	A	B

Table 8A - NO BUILD/BUILD - Eastbound Level-of-Service - Design Year 2038

Year 2038 No Build/Build for Interstate 30 Eastbound Main Lanes and Ramps LOS					
Description	Roadway Element	No Build		Build	
		Main Lane or Ramp LOS		Main Lane or Ramp LOS	
		AM	PM	AM	PM
West of Highway 70	Mainlane	B	C	B	C
Exit Ramp to Highway 70	Exit Ramp	C	D	C	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	B	C	B	C
Entrance Ramp from Highway 70	Entrance Ramp	D	D	C	C
Between Highway 70 Entrance Ramp & Highway 67 Exit Ramp	Mainlane	D	E	C	C
Exit Ramp to Highway 67	Exit Ramp	E	E	C	C
Between Highway 67 Exit & Entrance Ramps	Mainlane	D	D	B	B
Entrance Ramp from Highway 67	Entrance Ramp	F	F	D	D
Between Highway 67 Entrance Ramp & South Street Exit Ramp	Mainlane	F	F	D	D
Exit Ramp to South Street	Exit Ramp	F	F	D	D
Between South Street Exit & Entrance Ramps	Mainlane	F	F	C	C
Entrance Ramp from South Street	Entrance Ramp	D	D	E	D
Between South Street Entrance Ramp & Highway 5 Exit Ramp	Mainlane	D	D	E	E
Exit Ramp to Highway 5	Exit Ramp	E	E	E	E
Between Highway 5 Exit & Entrance Ramps	Mainlane	C	C	C	C

Table 8B - NO BUILD/BUILD - Westbound Level-of-Service - Design Year 2038

Year 2038 No Build/Build for Interstate 30 Westbound Main Lanes and Ramps LOS					
Description	Roadway Element	No Build		Build	
		Main Lane or Ramp LOS		Main Lane or Ramp LOS	
		AM	PM	AM	PM
Between Highway 5 Exit & Entrance Ramps	Mainlane	B	D	B	D
Entrance Ramp from Highway 5	Entrance Ramp	B	D	B	D
Between Highway 5 Entrance Ramp & South Street Exit Ramp	Mainlane	C	E	C	E
Exit Ramp to South Street	Exit Ramp	C	E	C	E
Between South Street Exit & South Street Overpass	Mainlane	B	D	B	D
Between South Street & South Street Entrance Ramps	Mainlane	C	F	B	D
Entrance Ramp from South Street	Entrance Ramp	C	F	B	E
Between South Street Entrance Ramp & Highway 67 Exit Ramp	Mainlane	D	F	B	E
Exit Ramp to Highway 67	Exit Ramp	D	F	A	C
Between Highway 67 Exit & Entrance Ramps	Mainlane	C	F	B	D
Entrance Ramp from Highway 67	Entrance Ramp	C	F	B	C
Between Highway 67 Entrance Ramps	Mainlane			B	D
Entrance Ramp from Highway 67	Entrance Ramp			B	C
Between Highway 67 Entrance Ramp & Highway 70 Exit Ramp	Mainlane	C	F	B	D
Exit Ramp to Highway 70	Exit Ramp	C	F	B	D
Between Highway 70 Exit & Entrance Ramps	Mainlane	B	C	B	C
Entrance Ramp from Highway 70	Entrance Ramp	B	C	B	C
West of Highway 70	Mainlane	B	C	B	C

Intersection Operations

The level of service for the proposed intersections is presented in **Table 10A** and **10B**. **Tables 11A** and **11B** give a comparison of the "No Build" vs. the "Build" alternatives.

Highway 67/Highway 229 Operations

If the existing Highway 67 configuration were kept through the design year, there would be many movements over capacity. Following is a brief description of the operational improvements for the proposed intersection.

- The proposed intersection of North Frontage Road and Interstate 30 westbound exit ramp to Highway 67/229 would operate at LOS C in AM and at LOS D in PM for the design year 2038.
- The proposed intersection of the Interstate 30 eastbound exit ramp to Highway 67/229 and Interstate 30 eastbound entrance ramp from Highway 67/229 would operate at LOS C in AM and at LOS D in PM for the design year 2038.
- The intersection at the South Frontage Road and Highway 67/229 would operate at LOS F for the left-turn movement from the frontage road onto northbound Highway 67/229. This volume however is too low to warrant a signal but does provide a reasonable seconds-of-delay of 168.9 seconds (As shown in **Appendix E**).
- This proposed alternative meets a design speed of sixty miles-per-hour along Highway 67 and also is designed to handle the demand of additional traffic generated from the future Benton Town Center.

South Street Operations

If the existing South Street configuration were kept through the design year, there would be many conflicting movements. Following is a brief description of the operational improvements for the proposed intersection.

- Conflicting left turn movements will be removed by realigning the intersections to prohibit these movements from the proposed West South Street and Leander Street; North Frontage Road and West South Street intersections.
- West South Street remains a three lane road east of this intersection, but is a four lane road on the overpass to balance the lane use.
- West Sevier Street will have its access removed from the eastbound entrance ramp to increase the length for the entrance ramp.

- The Woodland Drive and West Sevier Street intersection will change from a two-way stop controlled intersection with free movements for West Sevier Street to an all-way stop controlled intersection to improve safety.
- The North Frontage Road and West South Street intersection in the existing configuration will operate at LOS E in the 2038 design year. But the proposed condition will turn this intersection into a roundabout which would operate at an overall LOS A during both the AM and PM peak hours in the 2038 design year.
- The South Frontage Road and Leander Street intersection in existing configuration will operate at LOS E in northbound direction during AM peak hours in the design year 2038. The proposed intersection will operate at LOS C in the design year 2038.
- The movements of the West South Street and left turning from Bell Street in the existing condition will operate at LOS F in the AM and PM peak hours in the 2038 design year. The left turning movement from Bell Street will be removed in the proposed condition to improve operation. The northbound traffic will move through the bypass lane of the roundabout (N. Frontage Road and W. South Street intersection) in the proposed condition.
- There are a number of yield movements that were analyzed and the results are shown in the **Table 9** below as well as in **Appendix E.** None of the estimated delays are significant and have no impact to the traffic operations.

Table 9 - BUILD - Yield Sign Delay Per Vehicle - Year 2018 & 2038

Year 2018/2038 Build for Yield Sign Delay Per Vehicle at South Street																	
Description	Roadway Element	Build (AM)								Build (PM)							
		Stop Delay/Vehicle (s)				Total Delay/Vehicle (s)				Stop Delay/Vehicle (s)				Total Delay/Vehicle (s)			
		NB	EB [2.]	SB [1.]	WB [1.]	NB	EB [2.]	SB [1.]	WB [1.]	NB	EB [2.]	SB [1.]	WB [1.]	NB	EB [2.]	SB [1.]	WB [1.]
South Street 2018																	
W. South Street/Bell Street	Yield			0.2	0			1.4	0.2			0.4	0			1.3	0.4
W. South Street/Ramp A	Yield		2.8				6.9				0.9				4.3		
South Street 2038																	
W. South Street/Bell Street	Yield			0.2	0			1.4	0.4			0.3	0			1.4	0.5
W. South Street/Ramp A	Yield		5.2				9.5				2.6				6.4		

Notes:

1. Right Turn Movement
2. Through Movement

Table 10A - BUILD - Intersection Level-of-Service - Opening Year 2018

Year 2018 Build Intersection LOS for Highway 67 and South Street											
Description	Roadway Element	Build									
		Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67											
N. Frontage Road/Highway 67	Signalized Intersection	B	B	C	D	C	C	C	C	D	C
Eastbound Entrance/Exit Ramp and Highway 67	Signalized Intersection	C		D	C	C	C		D	C	C
S. Frontage Road (EB)/Highway 67 (NB/SB)	TWSC[2.]	B[1.]		A[1.]			D[1.]		B[1.]		
South Street											
W. Sevier Street/Woodland Drive	AWSC[3.]	A	A	A	A	A	A	A	A	A	A
N. Frontage Road/W. South Street (SB)	Roundabout	A	A		A	A	A	A		A	A
Leander Street/S. Frontage Road	TWSC			B[1.]					B[1.]		
S. Frontage Road (NB/SB)/Loop curve	TWSC		B[1.]					B[1.]			

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix E for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Table 10B - BUILD - Intersection Level-of-Service - Design Year 2038

Year 2038 Build Intersection LOS for Highway 67 and South Street											
Description	Roadway Element	Build									
		Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67											
N. Frontage Road/Highway 67	Signalized Intersection	C	B	C	D	C	E	D	D	E	D
Eastbound Entrance/Exit Ramp and Highway 67	Signalized Intersection	C		D	C	C	E		E	C	D
S. Frontage Road (EB)/Highway 67 (NB/SB)	TWSC[2.]	D[1.]		A[1.]			F[1.]		C[1.]		
South Street											
W. Sevier Street/Woodland Drive	AWSC[3.]	A	B	A	A	A	A	A	A	A	A
N. Frontage Road/W. South Street (SB)	Roundabout	A	A		A	A	A	A		B	A
Leander Street/S. Frontage Road	TWSC			C[1.]					B[1.]		
S. Frontage Road (NB/SB)/Loop curve	TWSC		B[1.]					B[1.]			

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix E for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Table 11A - NO BUILD/BUILD - Intersection Level-of-Service - Opening Year 2018

Year 2018 No-Build/Build Intersection LOS for Highway 67 and South Street																						
Description	Roadway Element	No Build										Roadway Element	Build									
		Intersection (AM)					Intersection (PM)						Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67																						
N. Frontage Road/Highway 67	TWSC[2.]			F	F				F	F		Signalized Intersection	B	B	C	D	C	C	C	C	D	C
Eastbound Entrance/Exit Ramp and Highway 67												Signalized Intersection	C		D	C	C	C		D	C	C
S. Frontage Road/Highway 67	TWSC	F[1.]					F[1.]					TWSC	B[1.]		A[1.]			D[1.]		B[1.]		
South Street																						
W. Sevier Street/Woodland Drive	TWSC	A[1.]	A[1.]	B	B		A[1.]	A[1.]	B	B		AWSC[3.]	A	A	A	A	A	A	A	A	A	A
W. South Street/Bell Street	TWSC	A[1.]			E		A[1.]			D												
N. Frontage Road/W. South Street	TWSC		C					B				Roundabout	A	A		A	A	A	A		A	A
W. Sevier Street/S. Frontage Road	TWSC		C					C														
Leander Street/S. Frontage Road	TWSC			D					C			TWSC			B[1.]					B[1.]		
W. South Street/Leander Street	TWSC		A[1.]	C	B			A[1.]	C	B												
S. Frontage Road (NB/SB)/Loop curve	TWSC		B[1.]		A[1.]			A[1.]		A[1.]		TWSC		B[1.]					B[1.]			

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix D or E for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Table 11B - NO BUILD/BUILD - Intersection Level-of-Service - Design Year 2038

Year 2038 No-Build/Build Intersection LOS for Highway 67 and South Street																						
Description	Roadway Element	No Build										Roadway Element	Build									
		Intersection (AM)					Intersection (PM)						Intersection (AM)					Intersection (PM)				
		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL		EB	WB	NB	SB	OVERALL	EB	WB	NB	SB	OVERALL
Highway 67																						
N. Frontage Road/Highway 67	TWSC[2.]			F	F				F	F		Signalized Intersection	C	B	C	D	C	E	D	D	E	D
Eastbound Entrance/Exit Ramp and Highway 67												Signalized Intersection	C		D	C	C	E		E	C	D
S. Frontage Road/Highway 67	TWSC	F[1.]					F[1.]					TWSC	D[1.]		A[1.]			F[1.]		C[1.]		
South Street																						
W. Sevier Street/Woodland Drive	TWSC	A[1.]	A[1.]	C	C		A[1.]	A[1.]	B	B		AWSC[3.]	A	B	A	A	A	A	A	A	A	A
W. South Street/Bell Street	TWSC	A[1.]			F		A[1.]			F												
N. Frontage Road/W. South Street	TWSC		E					C				Roundabout	A	A		A	A	A	A		B	A
W. Sevier Street/S. Frontage Road	TWSC		D					C														
Leander Street/S. Frontage Road	TWSC			E					D			TWSC			C[1.]					B[1.]		
W. South Street/Leander Street	TWSC		A[1.]	C	B			A[1.]	D	B												
S. Frontage Road (NB/SB)/Loop curve	TWSC		D[1.]		A[1.]			B[1.]		A[1.]		TWSC		B[1.]					B[1.]			

Notes:

1. Left Turn Movement
2. Two-Way Stop-Controlled (TWSC)
3. All-Way Stop-Controlled (AWSC)
4. HCM Control Delay (s/veh.) is located in Appendix D or E for each intersection
5. LOS - Level-of-Service as defined by the Highway Capacity Manual (HCM 2010 by Transportation Research Board) for intersections and implemented by Synchro Studio 8 by Trafficware Ltd.

Safety Analysis

The proposed improvements for the build alternative provide significant improvements to the Interstate 30 corridor. These improvements deliver an enhanced LOS throughout the corridor and they also provide inherent safety benefits to the traveling public.

The most significant improvement to the direct safety of the public will derive from the capacity increase along the Interstate 30 corridor. As shown in the section "Existing Condition Safety Analysis", the two predominant crash types along this corridor are single-vehicle crashes and rear-end crashes. The abundance of rear-end crashes stems from approaching maximum capacity during peak hours which leads to stop-and-go traffic. Under this condition, vehicles accelerate in short bursts and then quickly come to a stop since a constant-speed traffic stream never develops due to congestion. Rear-end collisions typically occur when the front vehicle brakes abruptly and the rear vehicle does not have enough space to stop. The increased capacity along the corridor will alleviate this major cause of crashes which will create a safer interstate for all vehicles. The existing curvature along Interstate 30 west of W. South Street near Highway 229 will be reduced from the existing 3 degree curve, the vertical profile of the Interstate will be improved, safety barriers will be added in the median, and signage will be improved and updated. These many improvements along with increasing the capacity will provide safer driving conditions and should help reduce the single-vehicle crash amounts.

At the Highway 67 interchange, safety will be improved by the separation of the roadways for the two way frontage roads and ramps for Interstate 30 west of Highway 67. This separation eliminates the conflict points where the ramps meet the two-way frontage roads. These conflict points pose a significant safety hazard since their configuration increases the potential for head-on collisions as well as sideswipes, particularly for drivers who are unfamiliar with the facility.

Driver safety will be enhanced by the placement of concrete median barrier at the Interstate 30 centerline between the eastbound and westbound lanes. This rigid barrier will provide improved safety over the existing flexible median barrier. In addition, Interstate 30 corridor safety will be improved by increasing the radii at sharp existing curves. This will allow for increased stopping sight distance and increased offset between the inside of the curve and the concrete median barrier.

Also, traffic operation disturbance to the main lanes will be reduced by adding deceleration lanes at several exit ramps. Vehicles will be able to decelerate more safely outside the path of interstate through-traffic. Similarly, by increasing the length of several acceleration lanes, vehicles will be able to reach freeway speeds before merging while remaining out of the path of interstate through-traffic. The improvements are particularly significant in this section of the Interstate 30 corridor where trucks account for 30% of traffic. In addition, the guide signs along the corridor will be redesigned to provide drivers adequate advance notification for upcoming exits. This will allow drivers to choose the correct lane as early as possible and minimize abrupt last-second lane changes.

Finally, in order to address the existing safety issues at Highway 70 interchange, the third westbound lane will drop as an exit lane, ramp gore for the westbound exit ramp will be shifted east to eliminate

the existing grade break, deceleration lane will be added for the eastbound exit ramp to Highway 70, stopping sight distance will be improved and wider inside shoulder for Interstate 30 main lanes will be provided.

FUNDING PLAN

The project is currently funded by Connecting Arkansas Program with an estimated construction cost of $90 million. This project is also anticipated to be in the 2016-2019 Statewide Transportation Improvement Program (STIP).

SUMMARY

A summary of how the proposed corridor modifications meet the eight policy requirements discussed in *Procedures for New or Revised Freeway Access in Arkansas* is provided below.

1. The Interstate 30 corridor is used by most motorists commuting between Little Rock and Saline County as well as long distance pass-through traffic. There are no nearby parallel routes to Interstate 30 which would be able to support the large traffic volumes which exist on Interstate 30. The need satisfied by the proposed corridor alternative cannot be adequately satisfied by reasonable improvements to local roads and streets in the vicinity of the corridor.
2. This project will increase the capacity of the corridor mainly by adding an additional lane of traffic in each direction. Facilities such as HOV lanes and a corridor transit line would likely improve the capacity of Interstate 30 by reducing the amount of single passenger vehicles. However, no such facilities currently exist and there are no immediate plans or funding in the foreseeable future.
3. An operational and safety analysis performed for this corridor has concluded that the proposed improvements pose no significant adverse impact to the safety and operation of the interstate facility or the local street network based on current and planned future traffic projections. Furthermore, the results of this analysis indicate that the level of safety and operation will both be enhanced by the improvements described in this project.
4. The proposed access provided along this corridor connects only to public roads and will provide for all traffic movements.
5. This project is included in the AHTD Connecting Arkansas Program (CAP) as well as METROPLAN's "*Imagine Central Arkansas" 2040 Long Range Metropolitan Transportation Plan.* The area from Highway 70 to Sevier Street is listed under the headings of "Ten Year Project Priority List" and "Areawide Freeway System".
6. No future interchanges along this corridor are currently anticipated adjacent to this project.
7. The improvements prescribed by this project are not due to a new, expanded, or substantial change in current or planned future development or land use. Instead, these improvements are proposed in order to alleviate future congestion and improve capacity for an existing corridor.
8. The NEPA process will be completed after the first step has been finalized (determination of engineering and operational acceptability). Once final environmental approval is granted, the remaining project steps will be taken (development of final plans, specifications and engineering; right-of-way acquisition; and construction).

APPENDIX A – Average Daily Traffic (ADT)

EXHIBIT 5

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development

2013: 15,500
2018: 23,000
2038: 39,000

2013: 48,000
2018: 67,000
2038: 110,000

2013: 33,500
2018: 51,000
2038: 83,000

2013: 59,500
2018: 87,500
2038: 133,000

2013: 62,500
2018: 90,500
2038: 133,000

Next Interchange:
4.5 miles
NO DATA COLLECTED

Proposed Work

see figure 5.1
see figure 5.2
see figure 5.3
see figure 5.4
see figure 5.5

Inspection Station

SLIP RAMP

Lonsdale
8 Miles

Saline County

Benton

Haskell

0 1,000 2,000 3,000 4,000 Feet

(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

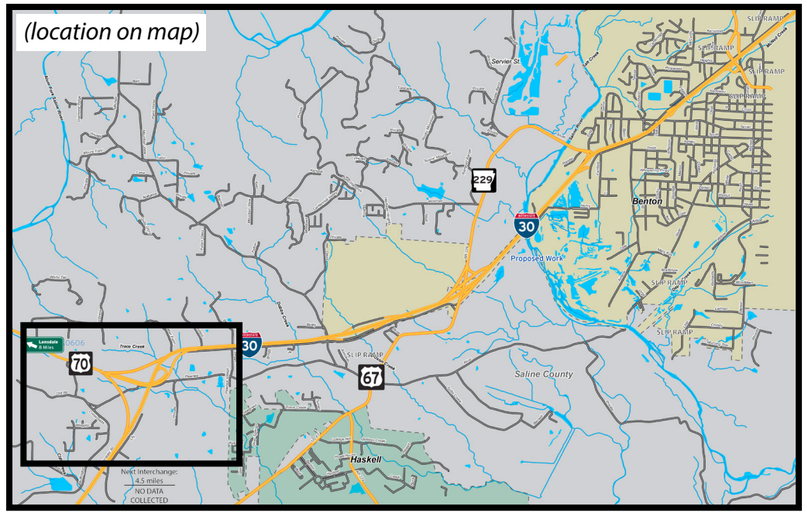
2013: Existing Count
2018: Opening Year
2038: Design Year

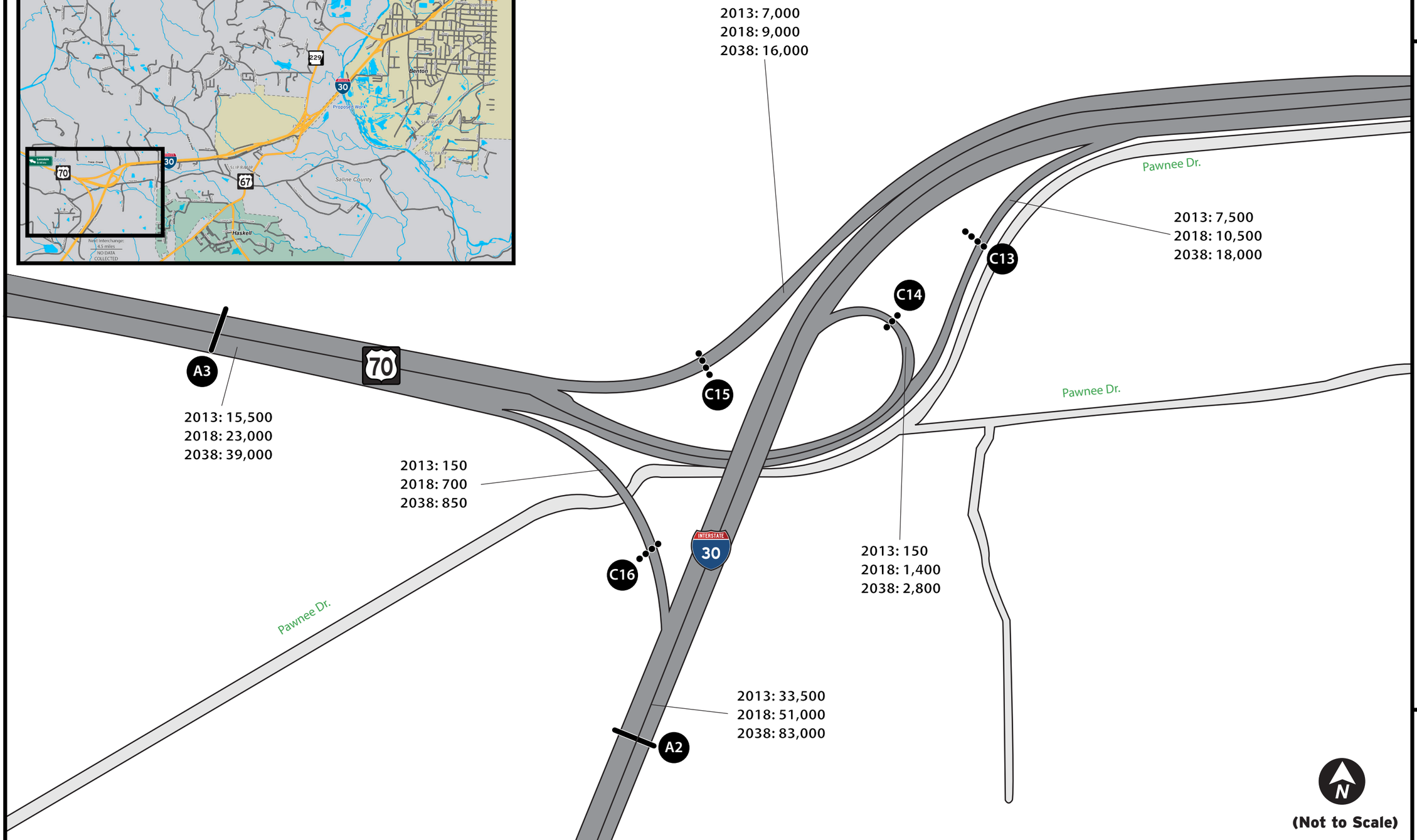
*Volumes may not balance due to rounding

January 2014

EXHIBIT 5.1

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development





Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding

CONNECTING ARKANSAS PROGRAM CAP

January 2014

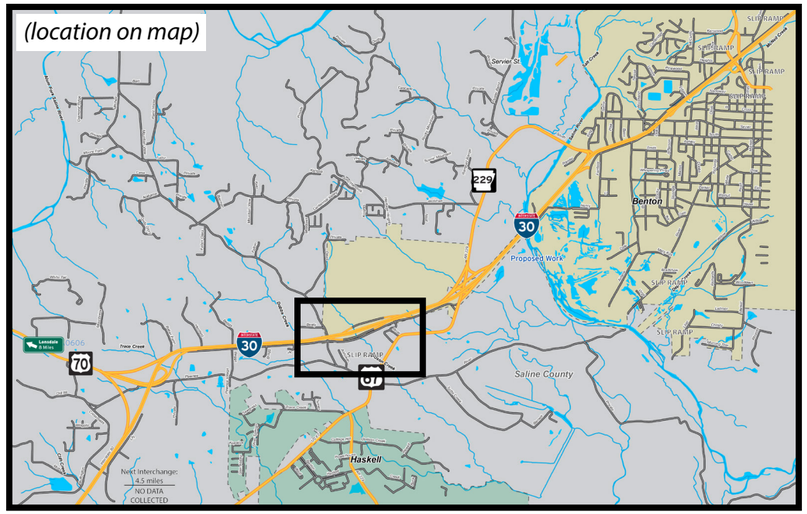
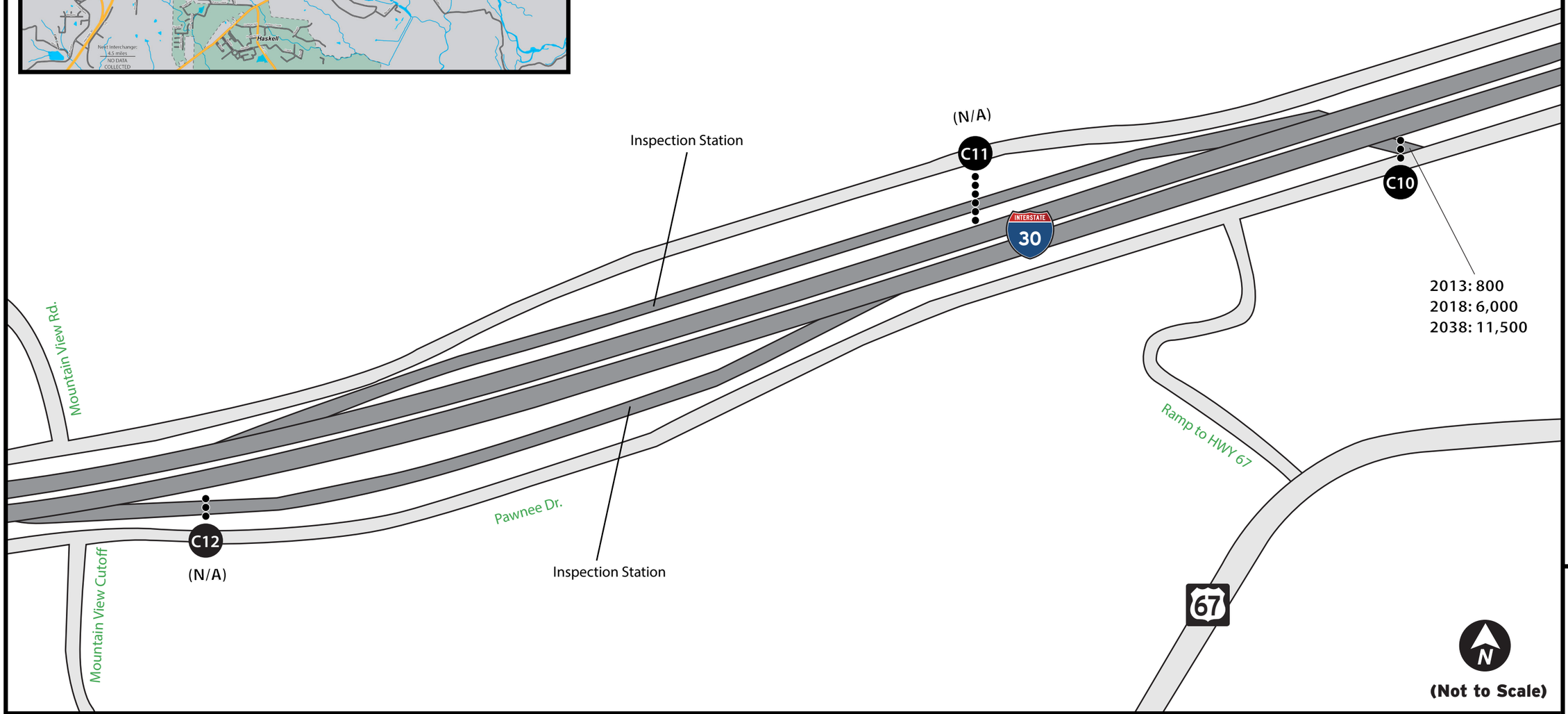


EXHIBIT 5.2

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development



Legend

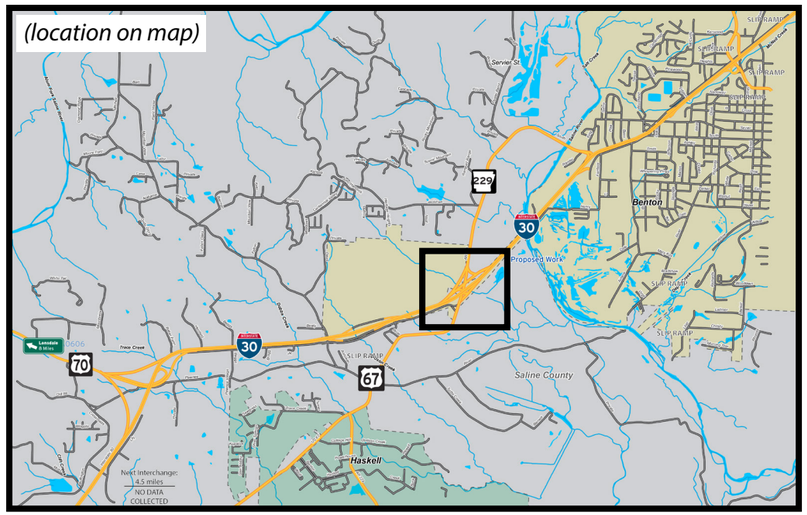
- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding
(N/A): Counts not forecasted - Minimal Usage on Ramp

CONNECTING ARKANSAS PROGRAM CAP

January 2014



2013: 6,400
2018: 13,500
2038: 18,500

2013: 6,400
2018: 18,000
2038: 25,000

2013: 550
2018: 5,000
2038: 8,800

(Not to Scale)

EXHIBIT 5.3

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development

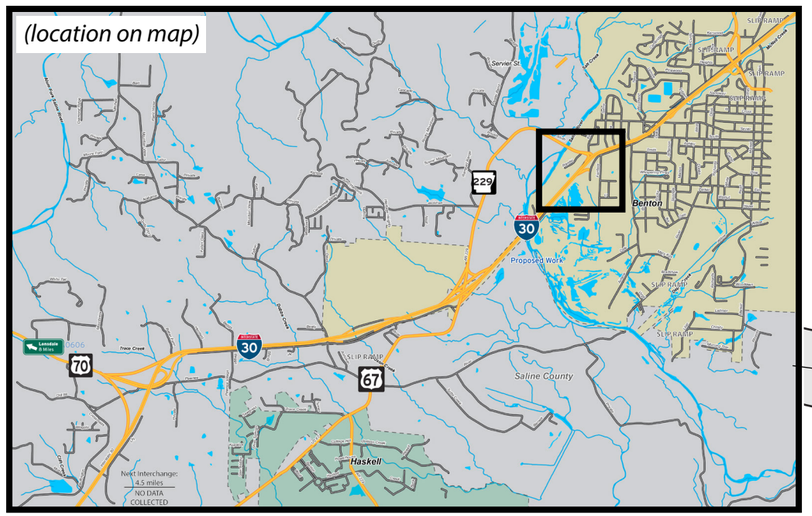
January 2014

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding



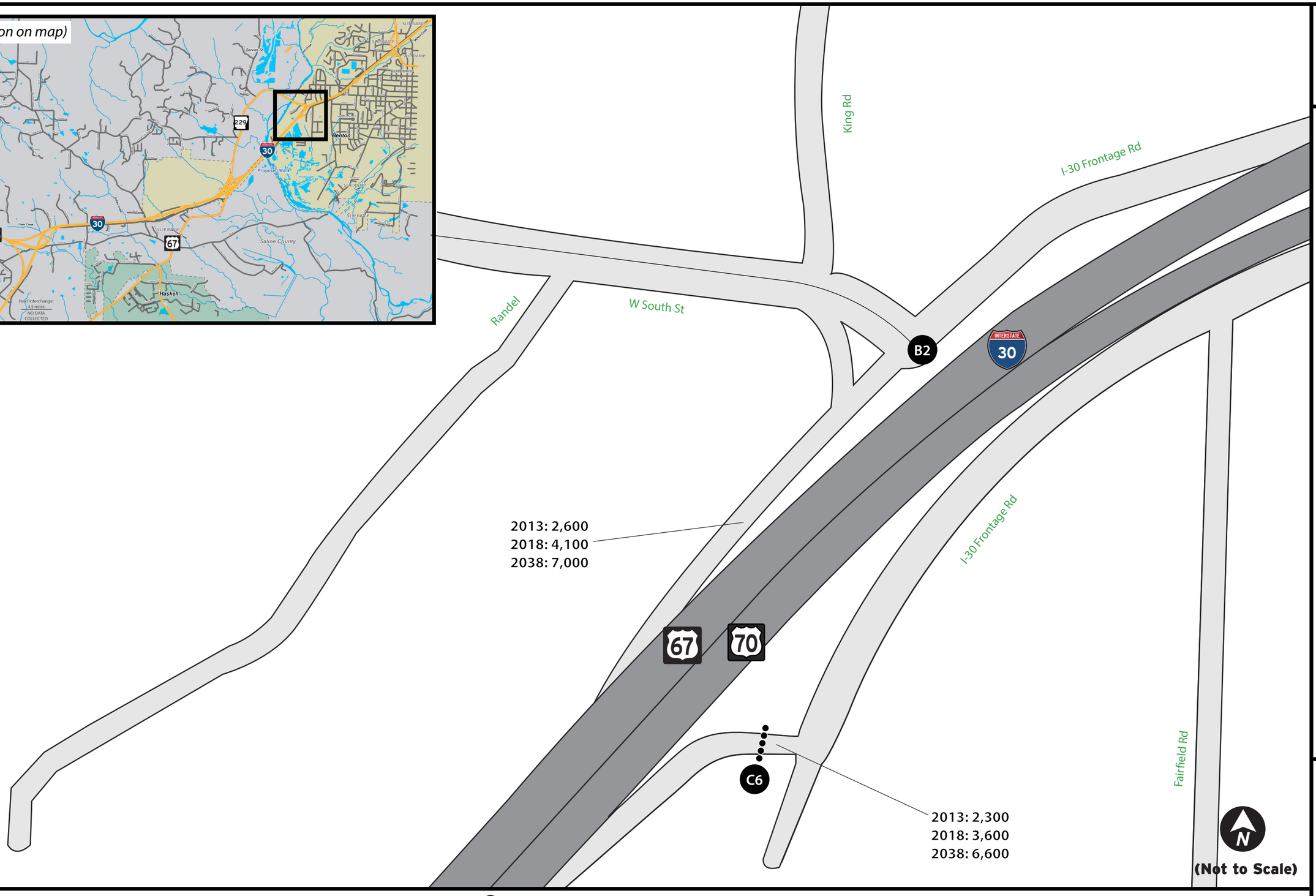


EXHIBIT 5.4

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development

Legend

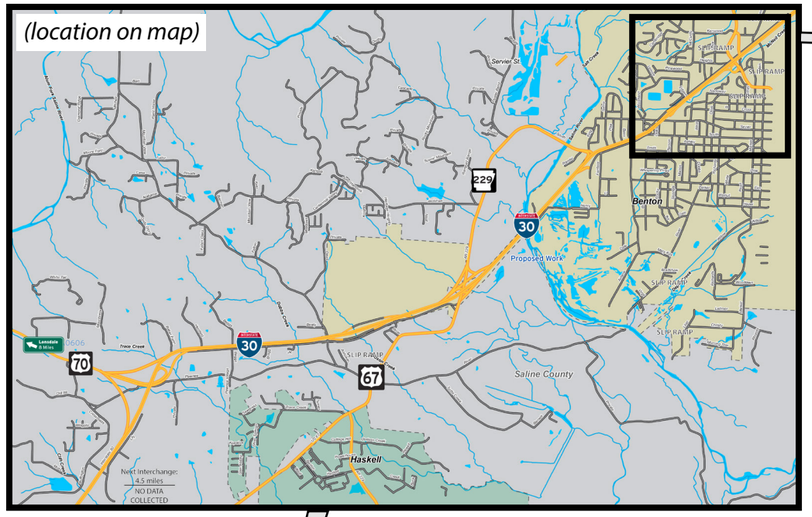
- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

***Volumes may not balance due to rounding**

CONNECTING ARKANSAS PROGRAM CAP

January 2014



(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding

EXHIBIT 5.5

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - With Development

CONNECTING ARKANSAS PROGRAM CAP

January 2014

EXHIBIT 6

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development

2013: 15,500**
2018: 18,500
2038: 30,000**

2013: 48,000
2018: 58,500
2038: 90,500

2013: 33,500**
2018: 42,500
2038: 63,500**

2013: 59,500
2018: 70,000
2038: 106,000

2013: 62,500**
2018: 73,000
2038: 106,000**

see figure 6.1
see figure 6.2
see figure 6.3
see figure 6.4
see figure 6.5

Next Interchange:
4.5 miles
NO DATA COLLECTED

Proposed Work

Inspection Station

SLIP RAMP

Benton
Haskell
Saline County

0 1,000 2,000 3,000 4,000 Feet

(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

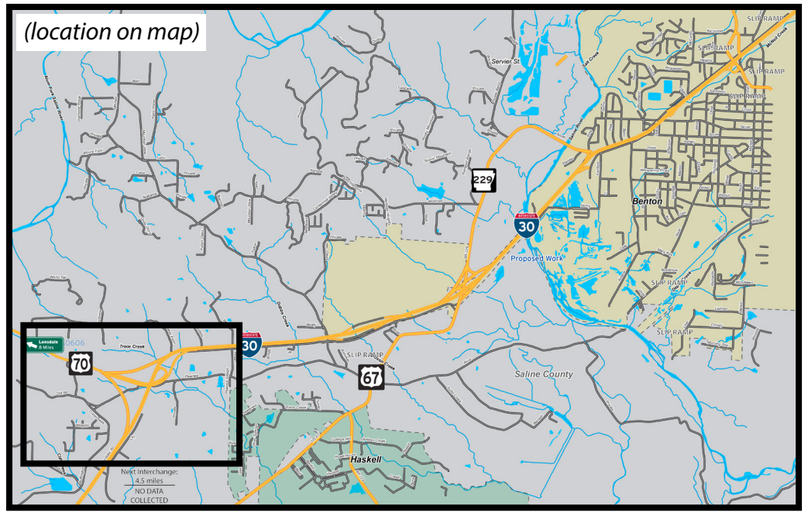
2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding
**Volumes may not match Figures 4-6 due to rounding and balancing.

February 2014

EXHIBIT 6.1

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development



2013: 7,000
2018: 8,000
2038: 13,500

2013: 7,500
2018: 9,000
2038: 15,000

2013: 15,500**
2018: 18,500
2038: 30,000**

2013: 150
2018: 300
2038: 300

2013: 150
2018: 200
2038: 350

2013: 33,500**
2018: 42,500
2038: 63,500**

Pawnee Dr.

Pawnee Dr.

Pawnee Dr.

A3 A2 C13 C14 C15 C16

70 30

(Not to Scale)

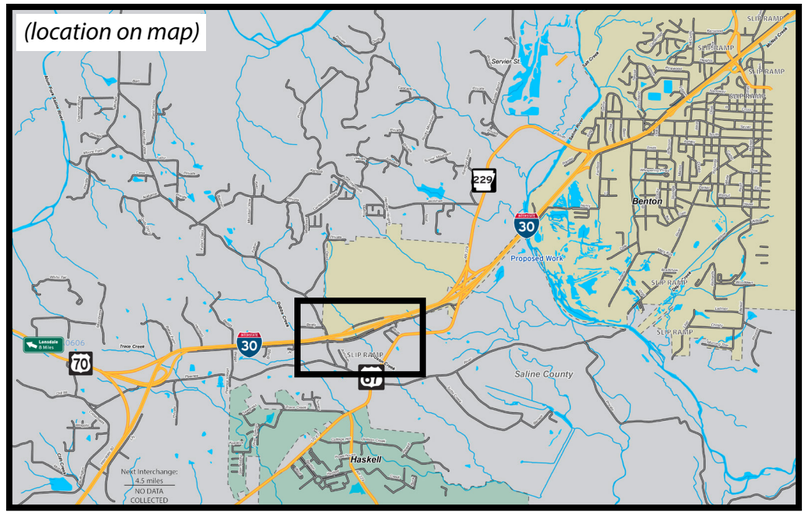
Legend

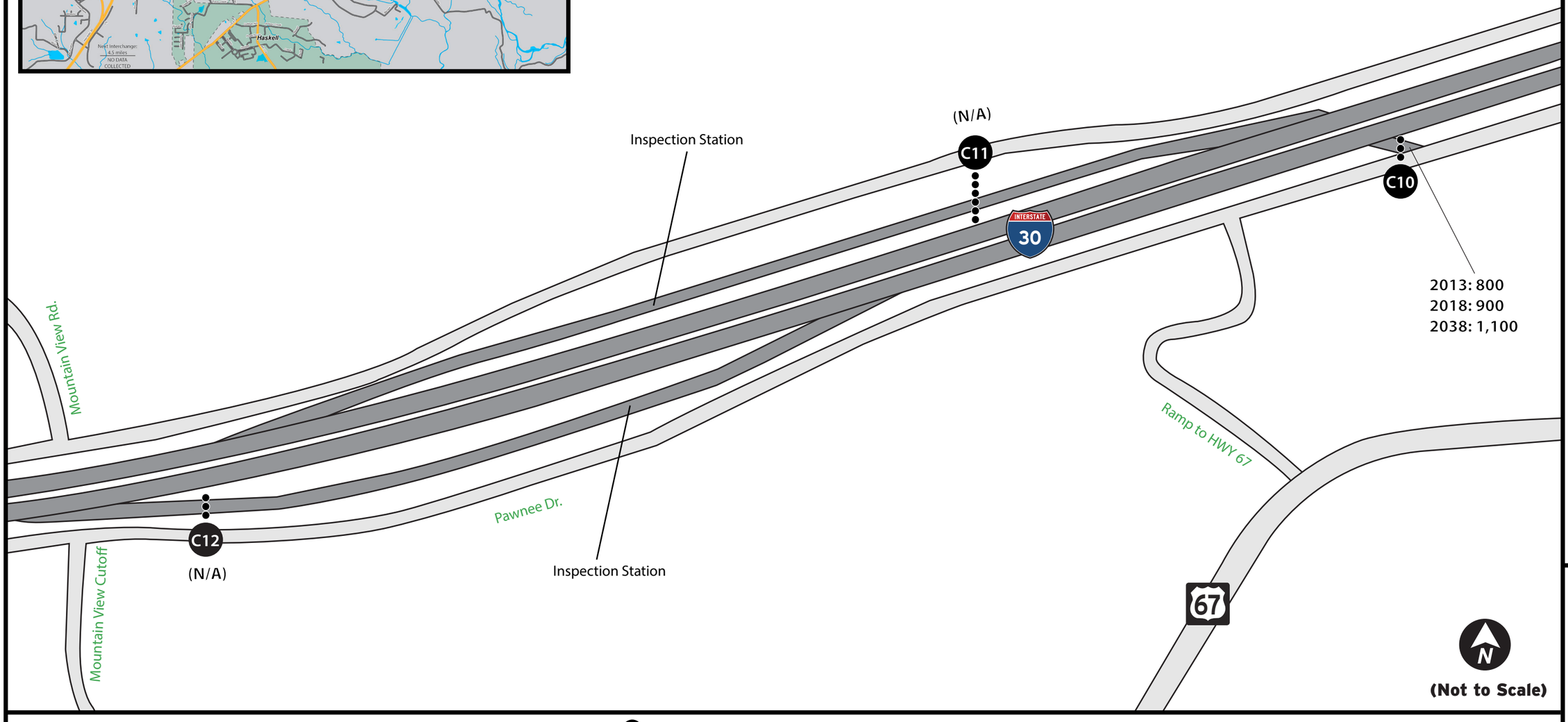
- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding
**Volumes may not match Figures 4-6 due to rounding and balancing.

February 2014





Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

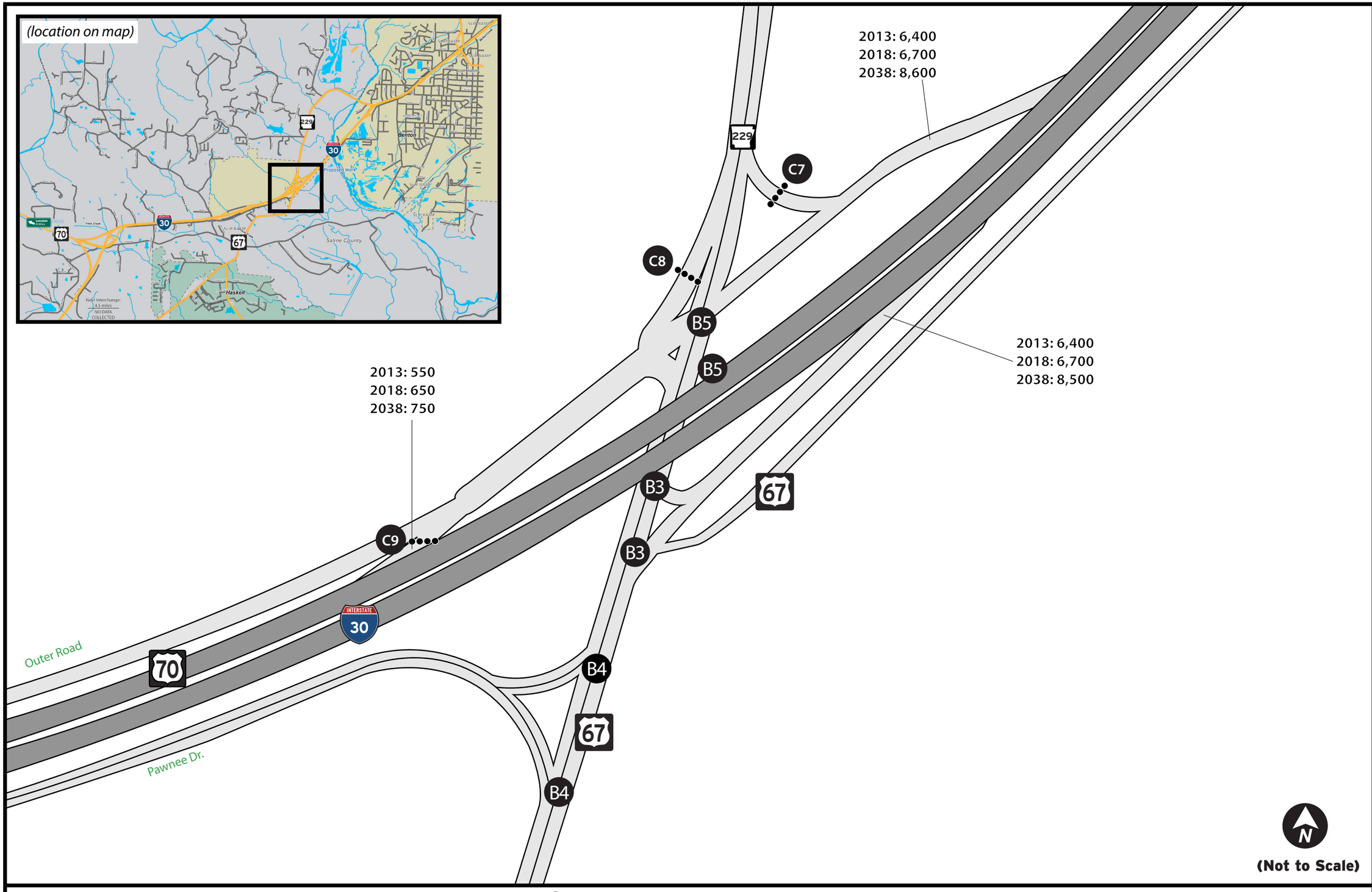
*Volumes may not balance due to rounding
(N/A): Counts not forecasted - Minimal Usage on Ramp

EXHIBIT 6.2

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development

CONNECTING ARKANSAS PROGRAM CAP

February 2014



(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding

EXHIBIT 6.3

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development

February 2014

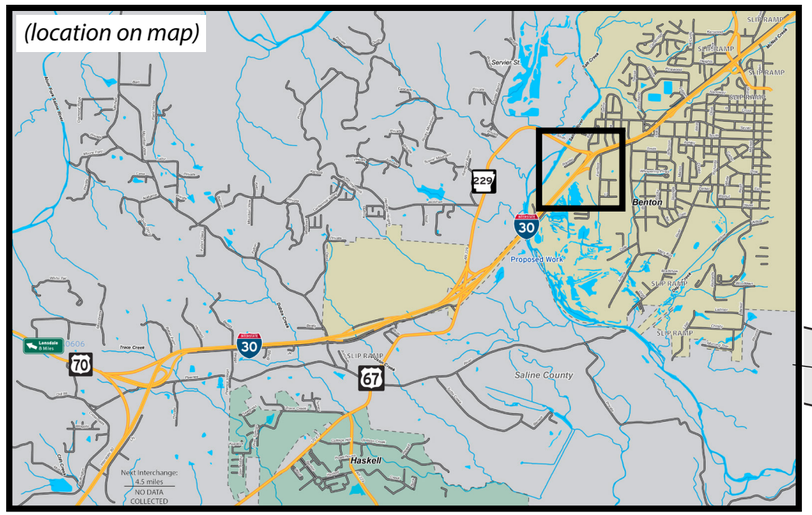


EXHIBIT 6.4

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development

King Rd

I-30 Frontage Rd

Randel

W South St

B2

INTERSTATE 30

2013: 2,600
2018: 3,000
2038: 5,400

67

70

I-30 Frontage Rd

Fairfield Rd

C6

2013: 2,300
2018: 2,900
2038: 5,100

N

(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding

CONNECTING ARKANSAS PROGRAM CAP

February 2014

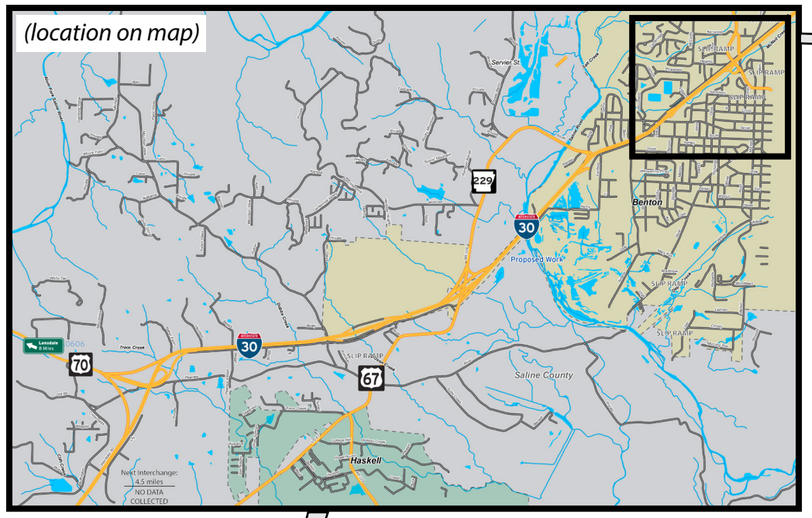


EXHIBIT 6.5

CA0601 - I-30 Widening
Highway 70 to Sevier Street
Annual Daily Traffic (ADT) - Without Development

Kenwood Rd.

Hot Springs Hwy.

Woodland Ave

Muaqua Ave

I-30 Frontage Rd

I-30 Frontage Rd

W Sevier St

W Sevier St

W South St

W South St

Leander St.

2013: 6,100
2018: 6,900
2038: 9,900

C2

C1

2013: 5,500
2018: 6,200
2038: 9,300

5

35

2013: 3,600
2018: 3,900
2038: 6,200

C4

C3

2013: 6,400
2018: 7,100
2038: 11,000

A1

2013: 3,300
2018: 3,700
2038: 4,500

C5

2013: 62,500**
2018: 73,000
2038: 106,000**

INTERSTATE 30

2013: 4,800
2018: 5,100
2038: 6,200

B1

70

67

N

(Not to Scale)

Legend

- A Mainline Count
- B Turning movement count
- C Ramp count

2013: Existing Count
2018: Opening Year
2038: Design Year

*Volumes may not balance due to rounding

**Volumes may not match Figures 4-6 due to rounding and balancing.

CONNECTING ARKANSAS PROGRAM CAP

February 2014

APPENDIX B – Traffic Operation Stick Diagrams

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				1-30 - Traffic Counts				

N BEGGS RD

FRONTAGE ROAD

MATCH SHEET 2 OF 8

1370
2760
B/C (2)

I-30

2170
2010
(2) C/B

B/B (2)
2170
2010

1370
2760
(2) B/D

910
710

(2) A/B
1260
1300

FRONTAGE ROAD

FRONTAGE ROAD

S BEGGS RD

460
1100

40
100

910
1660
A/B (2)

B/B (2)
1300
1400

PAWNEE DR

500
1200

40
100

US 70

1000
750

910
710

PAWNEE VILLAGE DR

PAWNEE DR

90
40

I-30

A/B (2)

A/B (2)

1000
1700

1300
1400

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 1 OF 8

7:08:02 PM
8/24/2015
mtripplett
S:\14407\DN\DGN\Plans_Non-PS&E\Traffic Counts\Exist - 2018\14407_TrafficCounts01_2018.dgn

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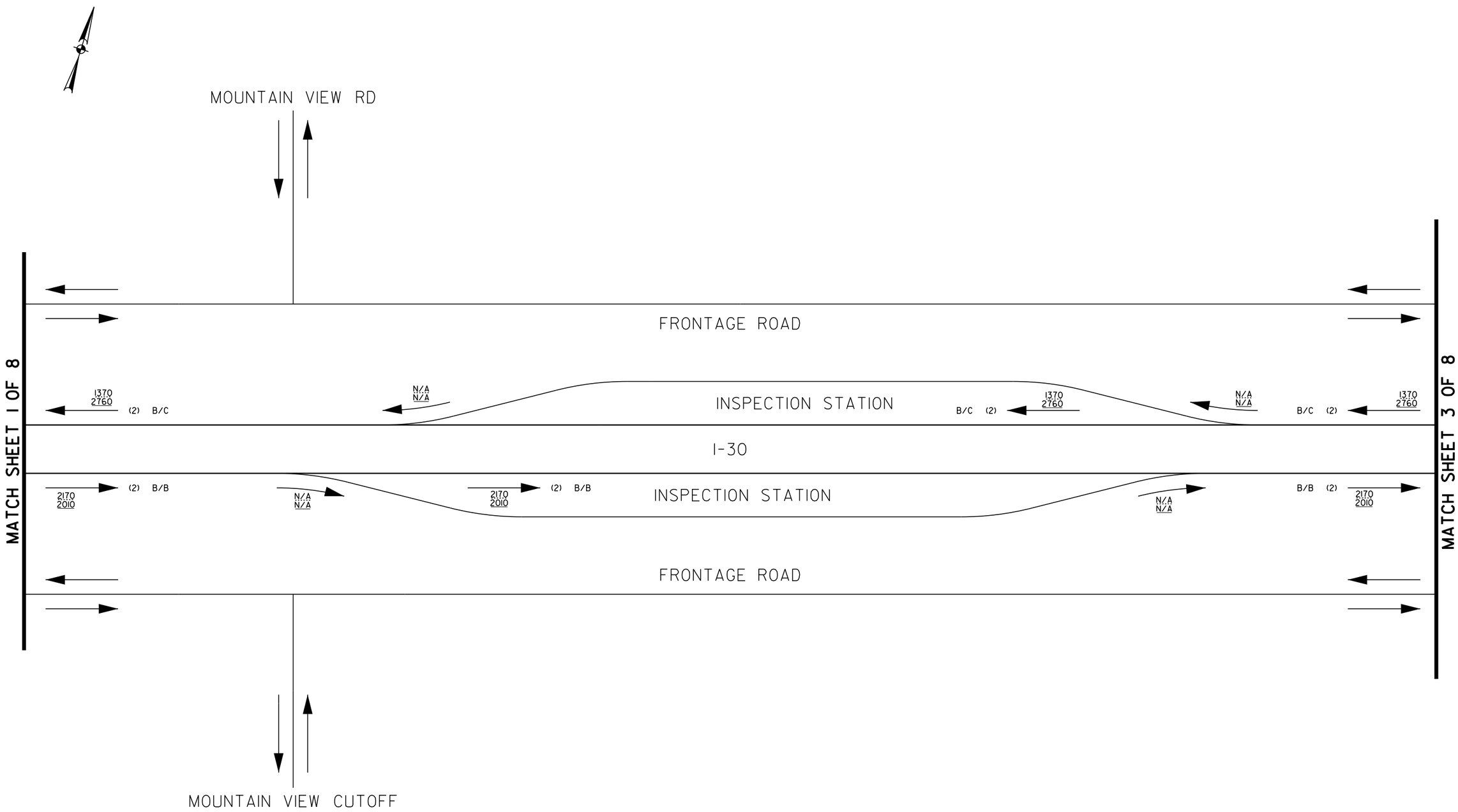
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 2 OF 8

7:08:02 PM
8/24/2015
mtrippett
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				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			

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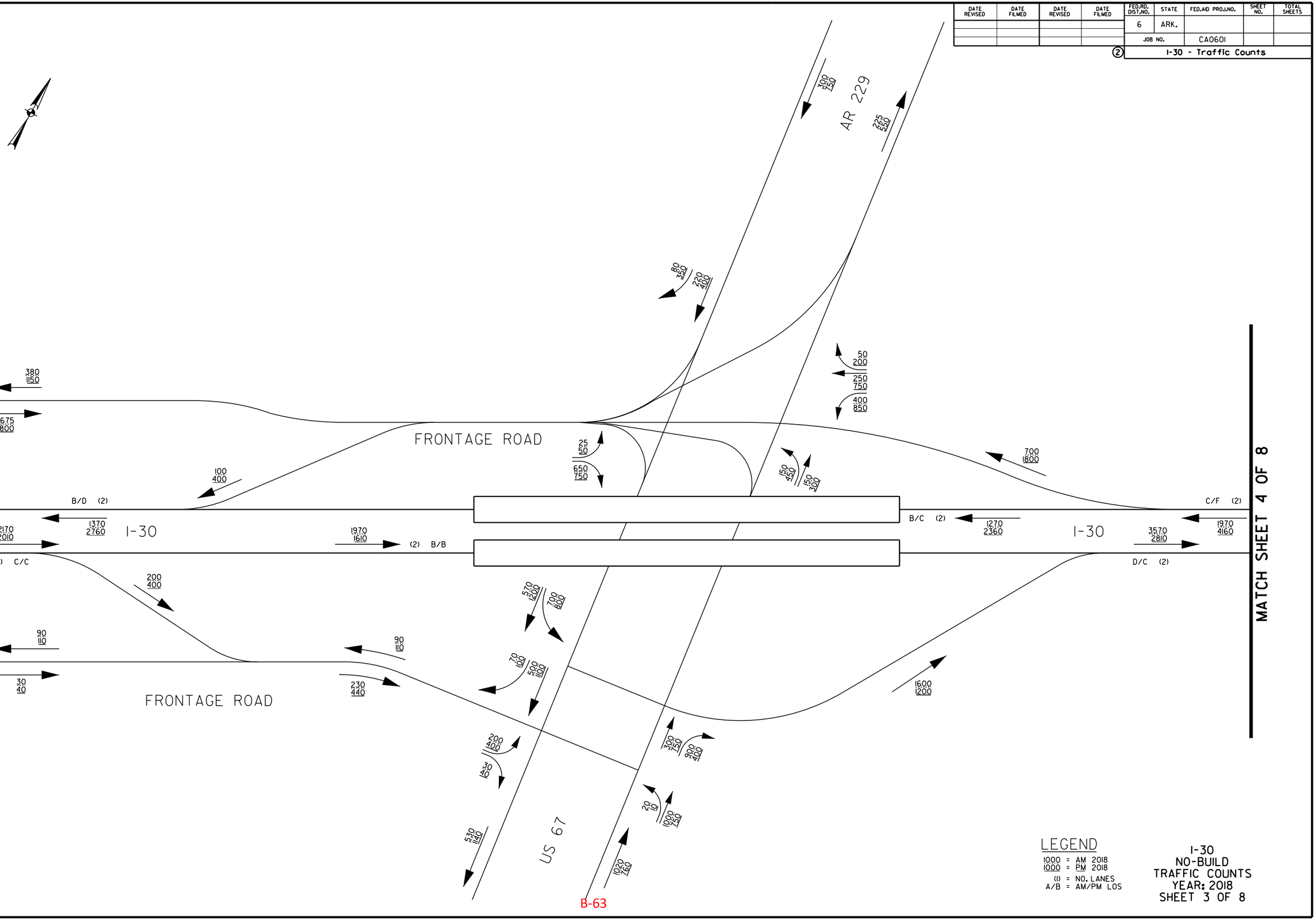

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 3 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

7:08:03 PM
8/24/2015
mtrippett

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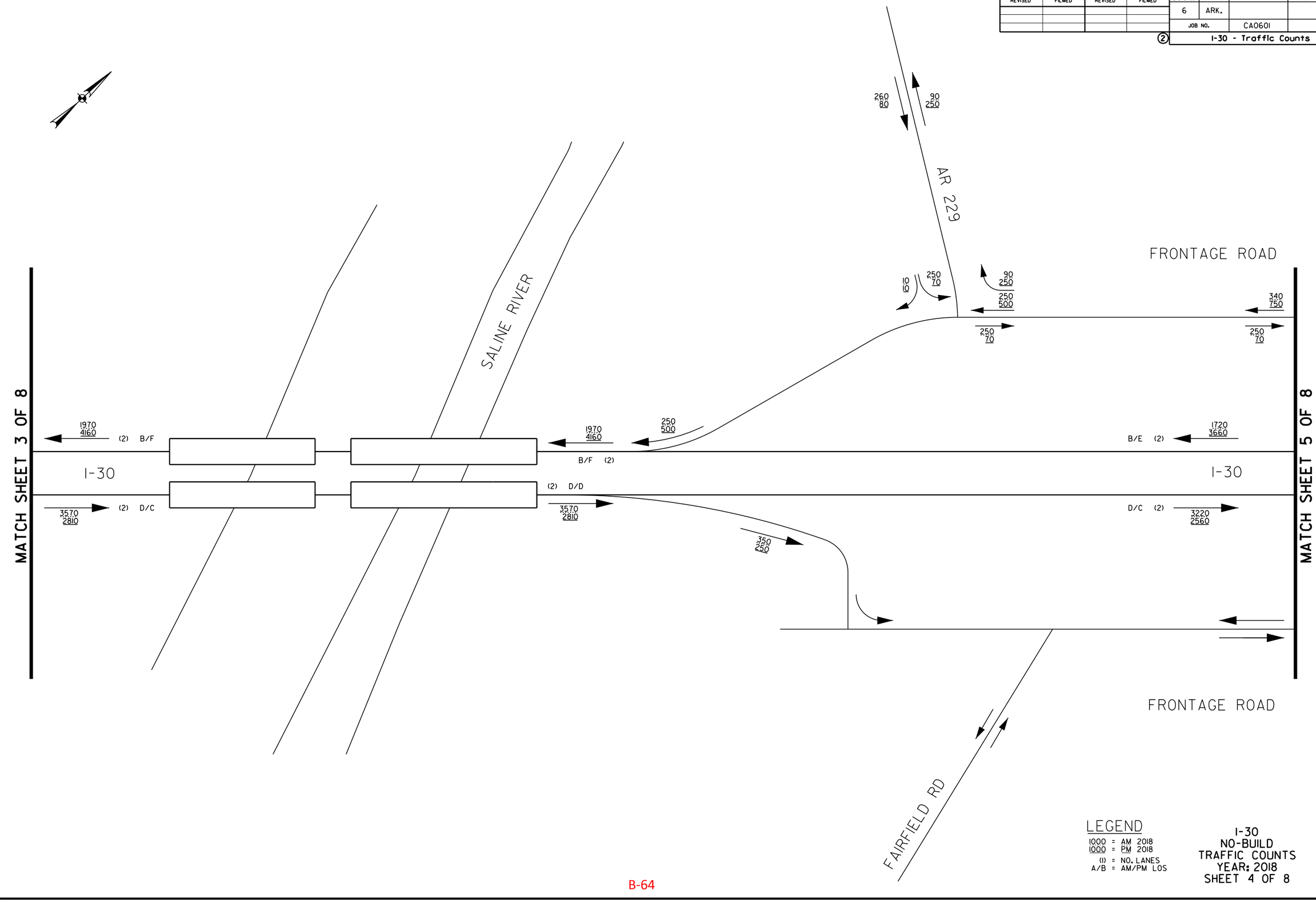

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 4 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			

TROUTT

PIKE RD

BASS LN

CROUCH ST

FRONTAGE ROAD

FRONTAGE ROAD

MATCH SHEET 4 OF 8

MATCH SHEET 6 OF 8

1720
3660 (2) B/E

B/E (2) 1720
3660

I-30

3220
2560 (2) D/C

D/C (2) 3220
2560

FRONTAGE ROAD

FRONTAGE ROAD

AIRLANE DR

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 5 OF 8

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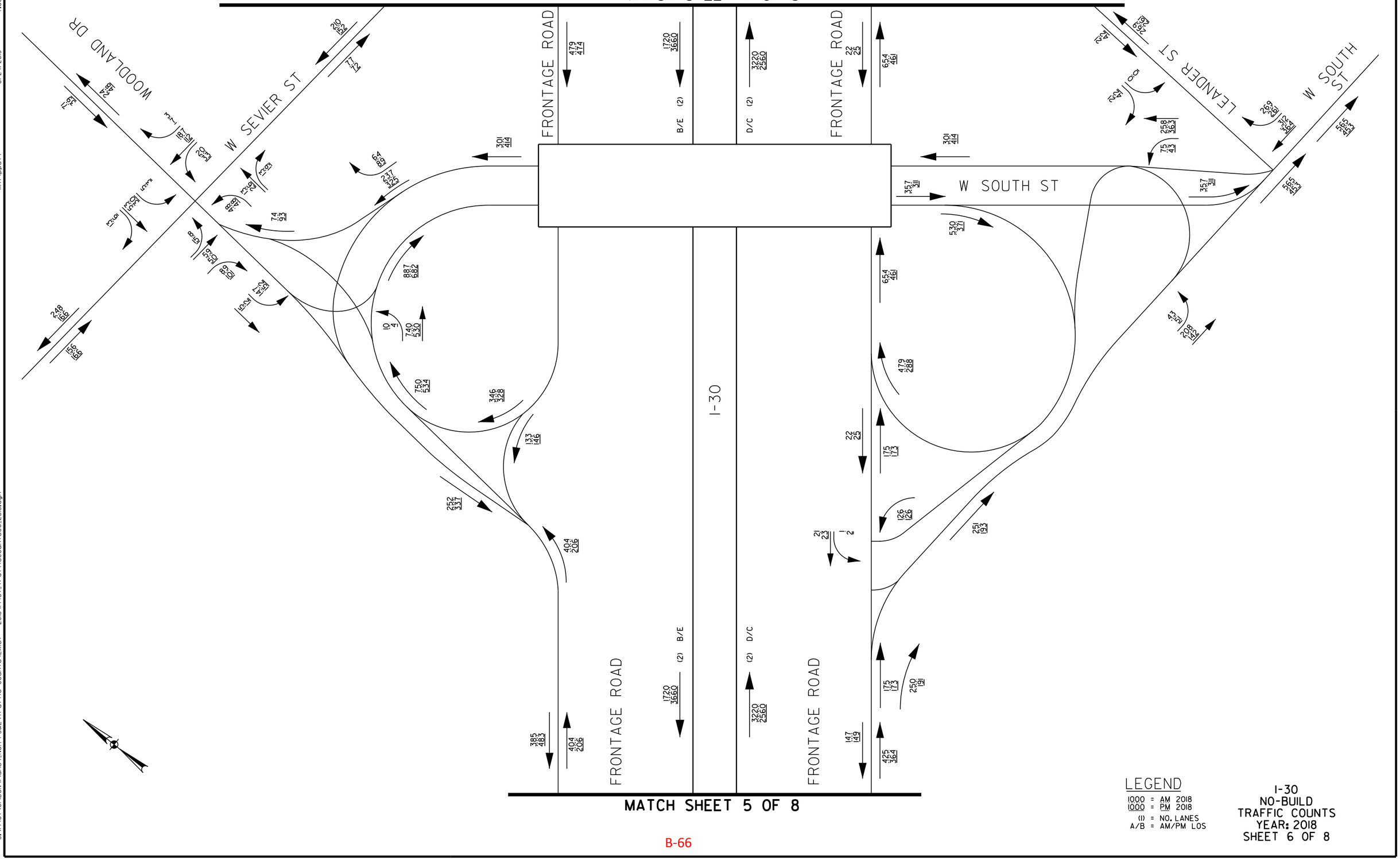
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



MATCH SHEET 5 OF 8

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 6 OF 8

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				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

MCNEIL CREEK

EDGEMOOR TERRACE

PINEWOOD DR

W SEVIER ST

77
72

210
152

612
554

212
104

479
474

402
402

FRONTAGE ROAD

MATCH SHEET 6 OF 8

1720
3660
(2) B/E

A/C (3)
1720
3660

400
450

B/D (3)
2120
4110

MATCH SHEET 8 OF 8

I-30

3220
2560
(2) D/C

3220
2560
(2) D/C

880
675

C/C (3)
4100
3235

MCNEIL CREEK

FRONTAGE ROAD

20
20

0
0

20
20

633
419

21
42

2
5

267
256

800
615

100
60

80
60

20
20

21
42

269
256

LEANDER ST

W SEVIER ST

198
86

198
86

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 7 OF 8

7:08:04 PM
8/24/2015
mtrippett
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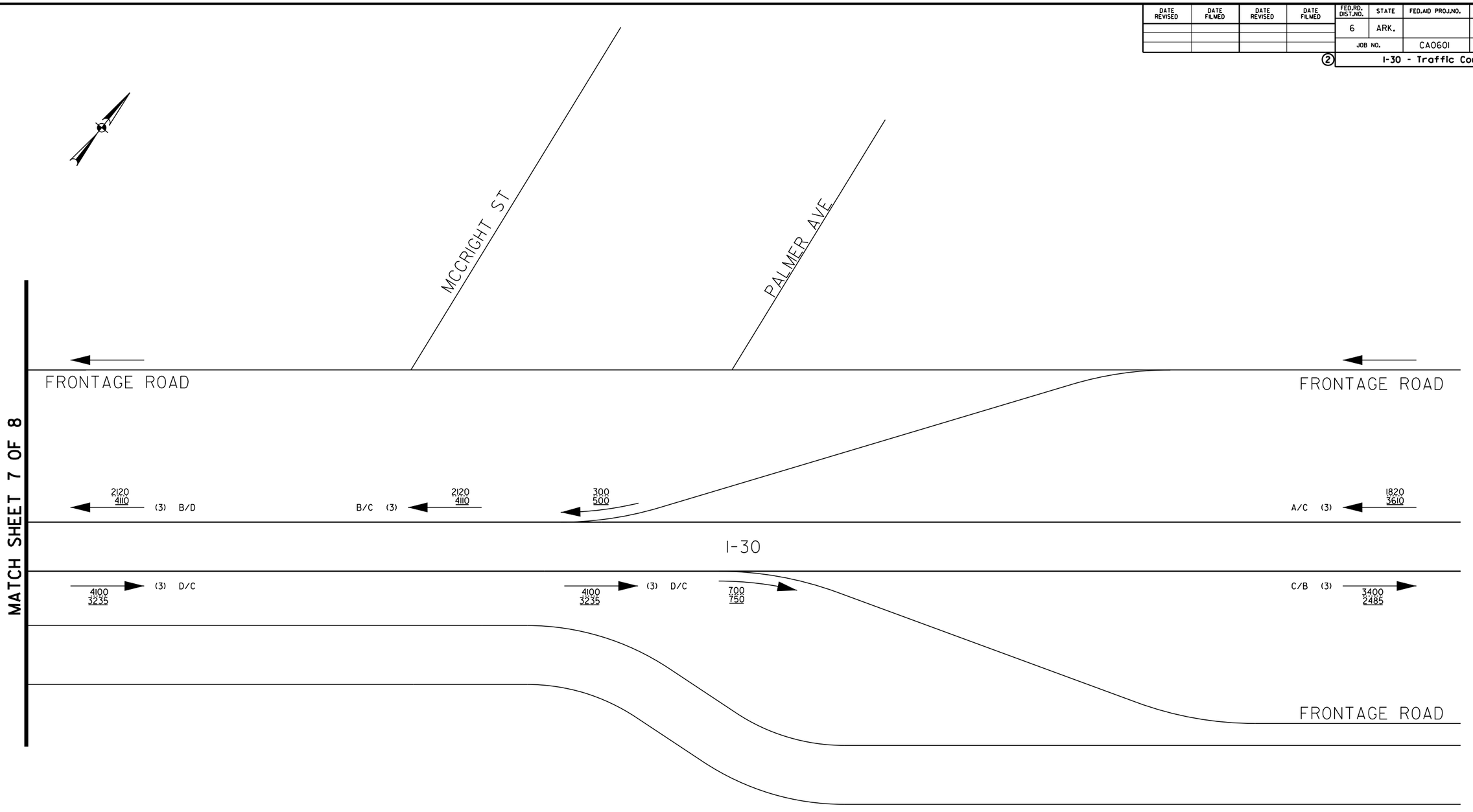
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 8 OF 8

8/24/2015 7:08:04 PM
mtrippett
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				6	ARK.			
				JOB NO.		CA0601		
				1-30 - Traffic Counts				

7:08:05 PM
8/24/2015
mtrippett

N BEGGS RD

FRONTAGE ROAD

1370
2760
A/B (3)

I-30

B/B (3) 2170 2010

B/B (3) 2170 2010

MATCH SHEET 2 OF 8

1370
2760
(3) A/B

910
710

(2) A/B
1260
1300

FRONTAGE ROAD

FRONTAGE ROAD

S BEGGS RD

460
1100

40
100

910
1660
A/B (2)

B/B (2)
1300
1400

PAWNEE DR

500
1200

40
100

US 70

1000
750

910
710

PAWNEE VILLAGE DR

PAWNEE DR

90
40

I-30

A/B (2)

A/B (2)

1000
1700

1300
1400

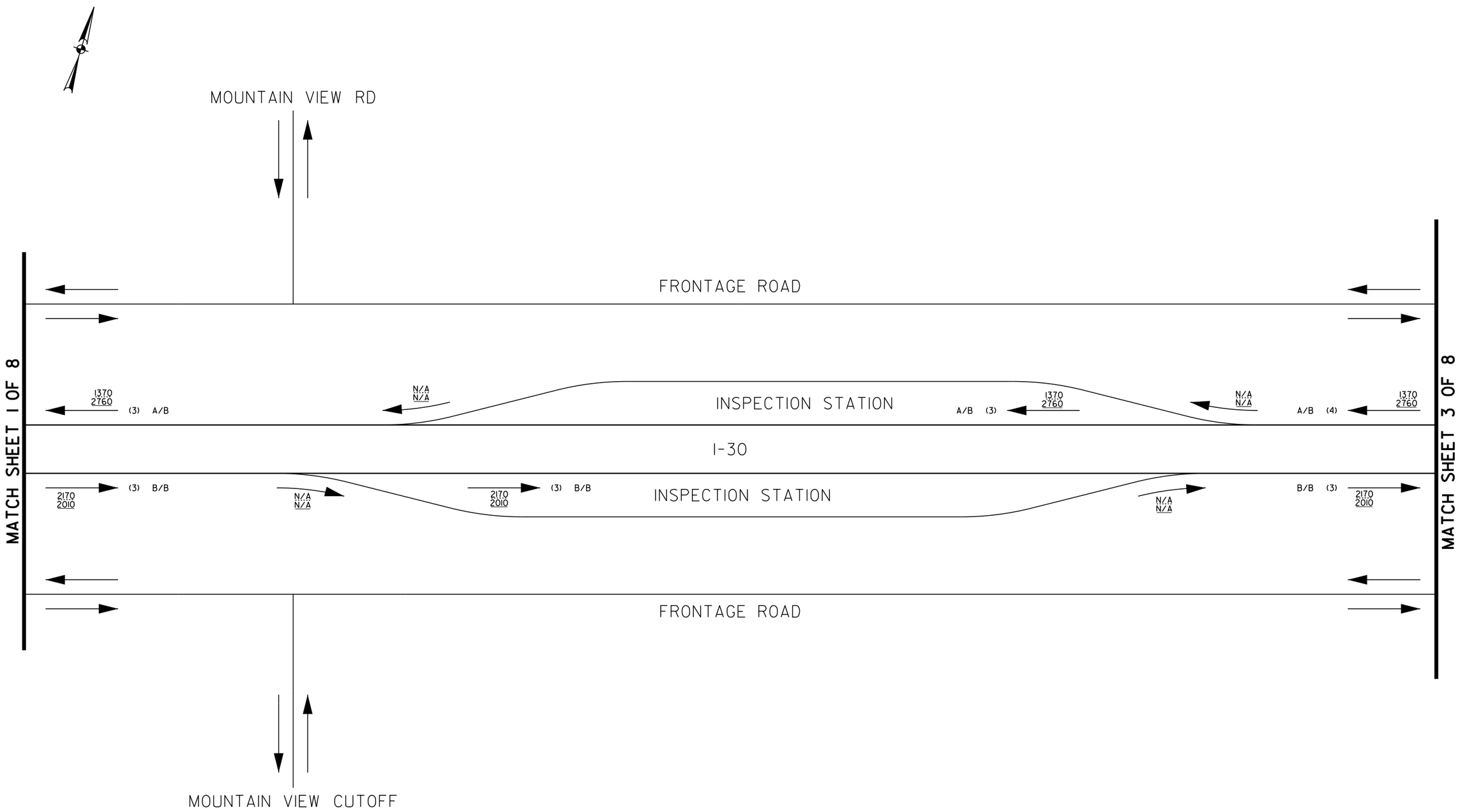
S:\14407\DN\DGN\Plans_Non-PS&E\Traffic Counts\ALT2 - 2018\14407_TrafficCountsOL-Alt_2018.dgn

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 1 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 2 OF 8

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mtripplett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

2 I-30 - Traffic Counts

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mtrippett

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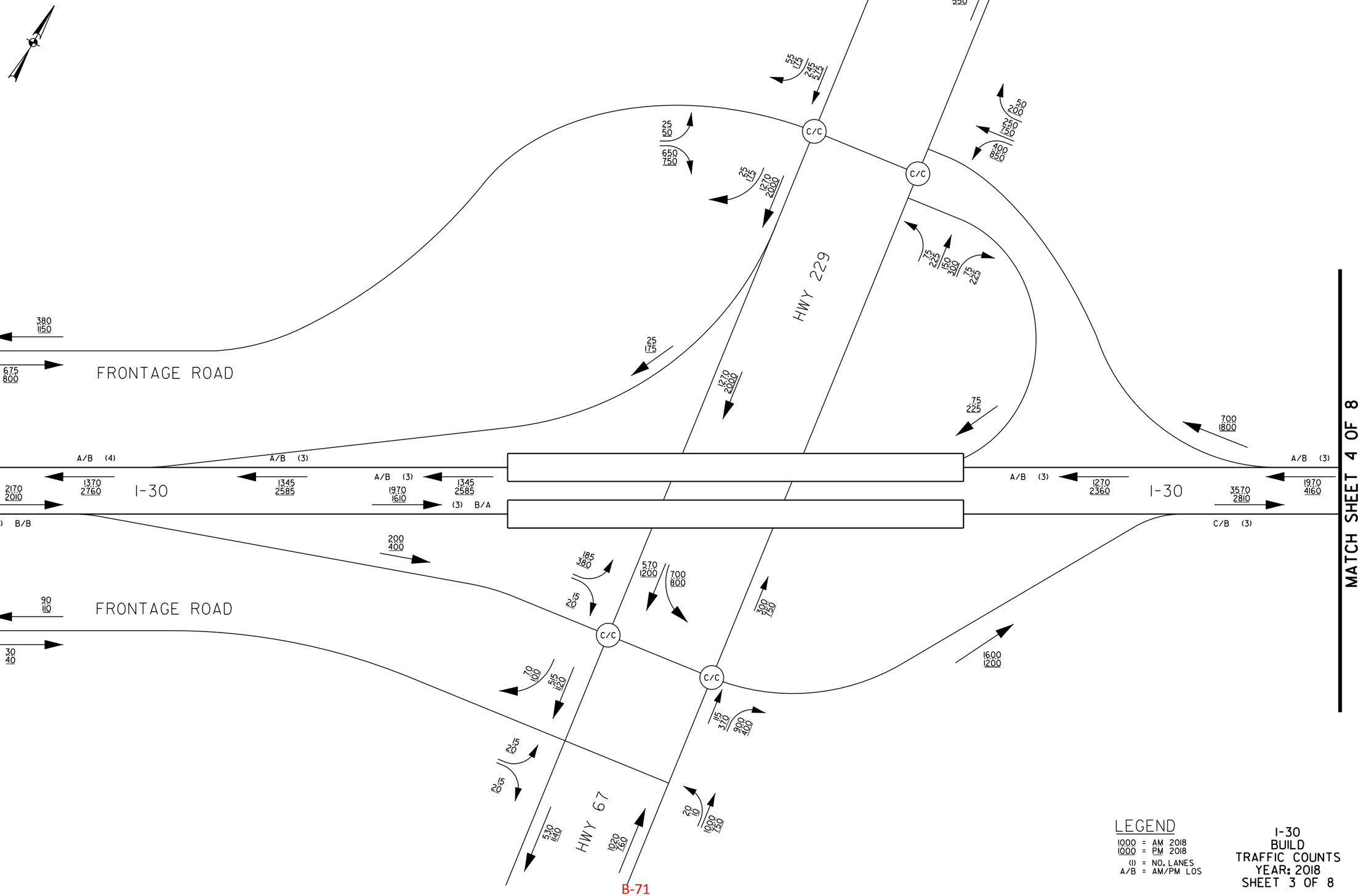

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 3 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

8/24/2015 7:08:06 PM
mtrippett

HWY. 229

260
80

90
250

SALINE RIVER

FRONTAGE ROAD

10
10

250
70

90
250

250
500

340
750

250
70

250
70

1970
4160

(3) B/C

1970
4160

250
500

B/C (3)

A/C (3)

1720
3660

I-30

I-30

MATCH SHEET

SHEET 3 OF 8

(3) C/C

3570
2810

(3) C/B

3570
2810

B/B (3)

3220
2560

350
250

MATCH SHEET

SHEET 5 OF 8

FRONTAGE ROAD

FAIRFIELD RD

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 4 OF 8

S:\14407\01\DGN\Plans_Non-PS&E\Traffic Counts\ALT2 - 2018\14407_TrafficCounts04_Alt_2018.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

TROUTT

PIKE RD

BASS LN

CROUCH ST

FRONTAGE ROAD

FRONTAGE ROAD

MATCH SHEET 4 OF 8

MATCH SHEET 6 OF 8

1720
3660
(3) A/C

A/C (3)
1720
3660

I-30

3220
2560
(3) B/B

B/B (3)
3220
2560

FRONTAGE ROAD

FRONTAGE ROAD

AIRLANE DR

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 5 OF 8

8/24/2015 7:08:06 PM
mtrippett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

MATCH SHEET 7 OF 8

W SEVER ST

WOODLAND DR

W SOUTH ST

LEANDER ST

FRONTAGE ROAD

FRONTAGE ROAD

I-30

A/C (3)

B/B (3)

MATCH SHEET 5 OF 8

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 6 OF 8

7:08:07 PM 8/24/2015 mtrippett
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				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			

7:08:07 PM
8/24/2015
mtrippett
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MCNEIL CREEK

EDGEMOOR TERRACE

PINEWOOD DR

W SEVIER ST

FRONTAGE ROAD

646 / 626

192 / 122

440 / 432

632 / 554

232 / 104

FRONTAGE ROAD

MATCH SHEET 6 OF 8

MATCH SHEET 8 OF 8

1720 / 3660 (3) A/C

A/C (3) 1720 / 3660

400 / 450

B/D (3) 2120 / 4110

I-30

3220 / 2560 (3) B/B

3220 / 2560 (3) B/B

880 / 675

C/C (3) 4100 / 3235

MCNEIL CREEK

50 / 65

FRONTAGE ROAD

606 / 452

542 / 359

64 / 93

50 / 65

338 / 316

880 / 675

LEANDER ST

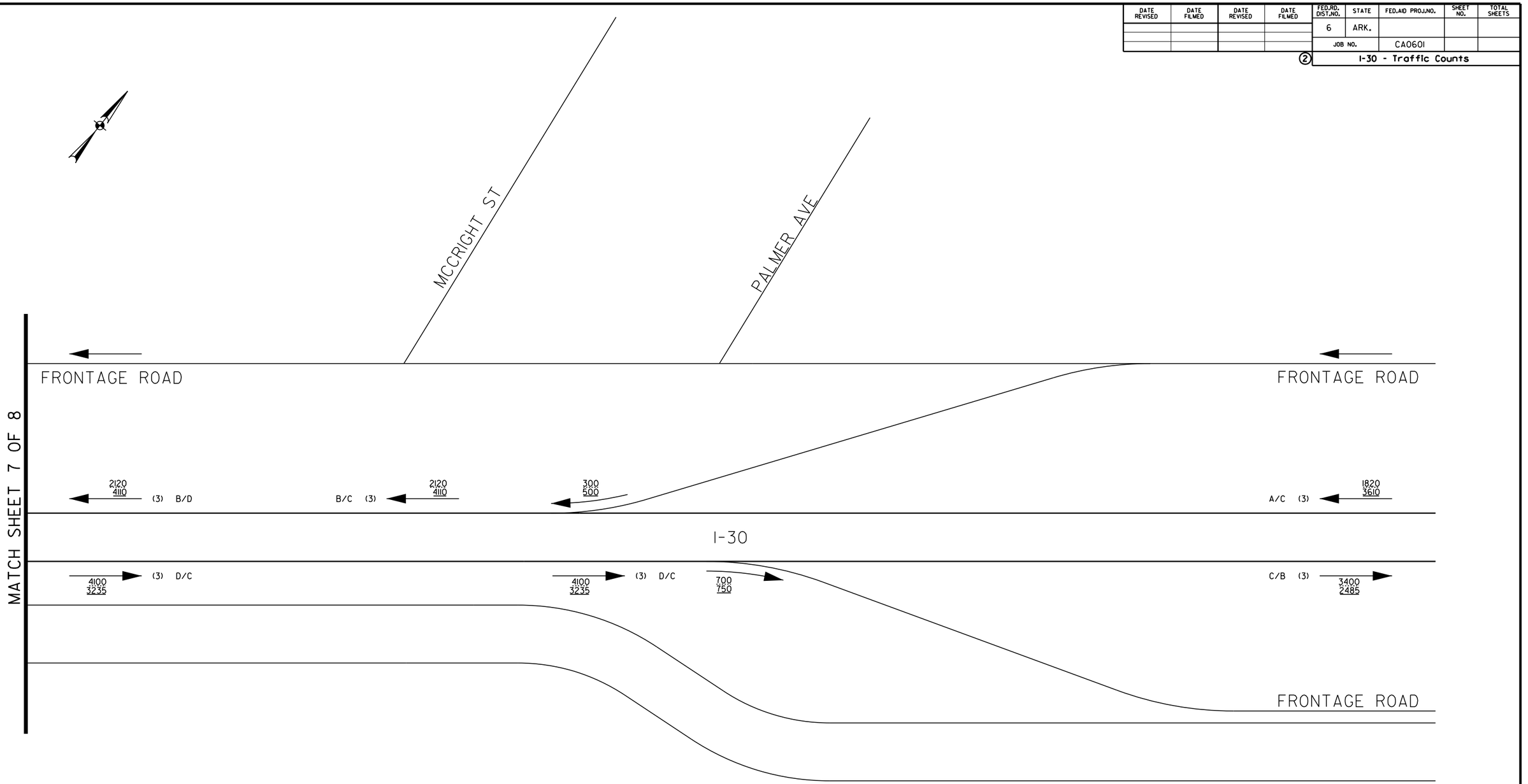
W SEVIER ST

LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 7 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



LEGEND

1000 = AM 2018
1000 = PM 2018
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2018
SHEET 8 OF 8

8/24/2015 7:08:08 PM
mtrippett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

2 I-30 - Traffic Counts

N BEGGS RD

FRONTAGE ROAD

MATCH SHEET 2 OF 8

2250
4350
C/F (2)

I-30

3500
3520
(2) D/D

D/E (2)
3500
3520

1500
1250

2250
4350
(2) C/F

(2) B/C
2000
2270

FRONTAGE ROAD

FRONTAGE ROAD

S BEGGS RD

750
1800

70
200

1500
2550
B/C (2)

C/D (2)
2070
2470

PAWNEE DR

820
2000

70
200

US 70

1600
1300

1500
1250

PAWNEE VILLAGE DR

PAWNEE DR

100
50

I-30

B/C (2)

B/C (2)

1600
2600

2070
2470

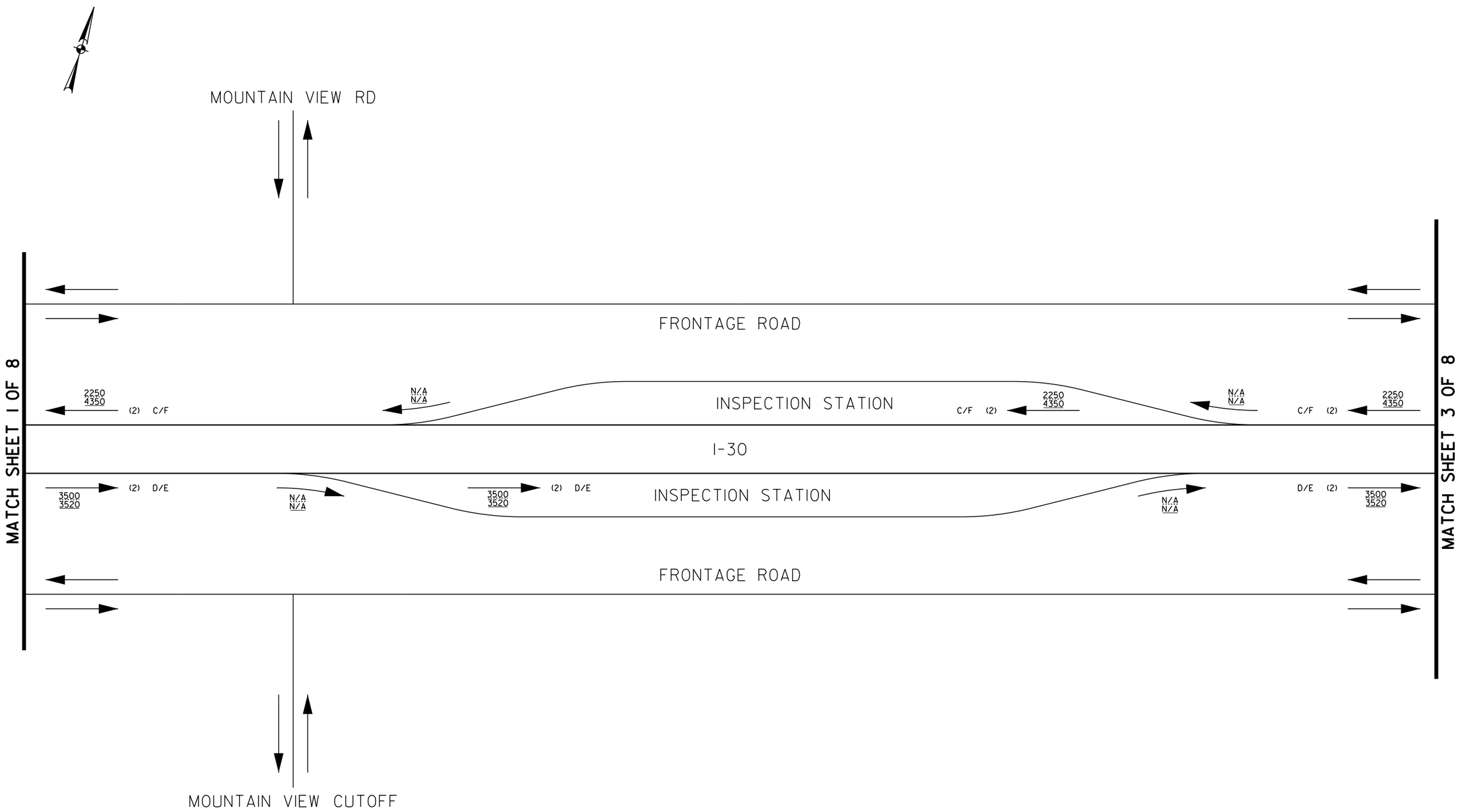
LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 1 OF 8

8/24/2015 7:08:08 PM
mtrippett
S:\1407\DN\DGN\Plans_Non-PS&E\Traffic Counts\Exist - 2038\1407_TrafficCounts01_2038.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 2 OF 8

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8/24/2015 7:08:08 PM
mtrippett

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

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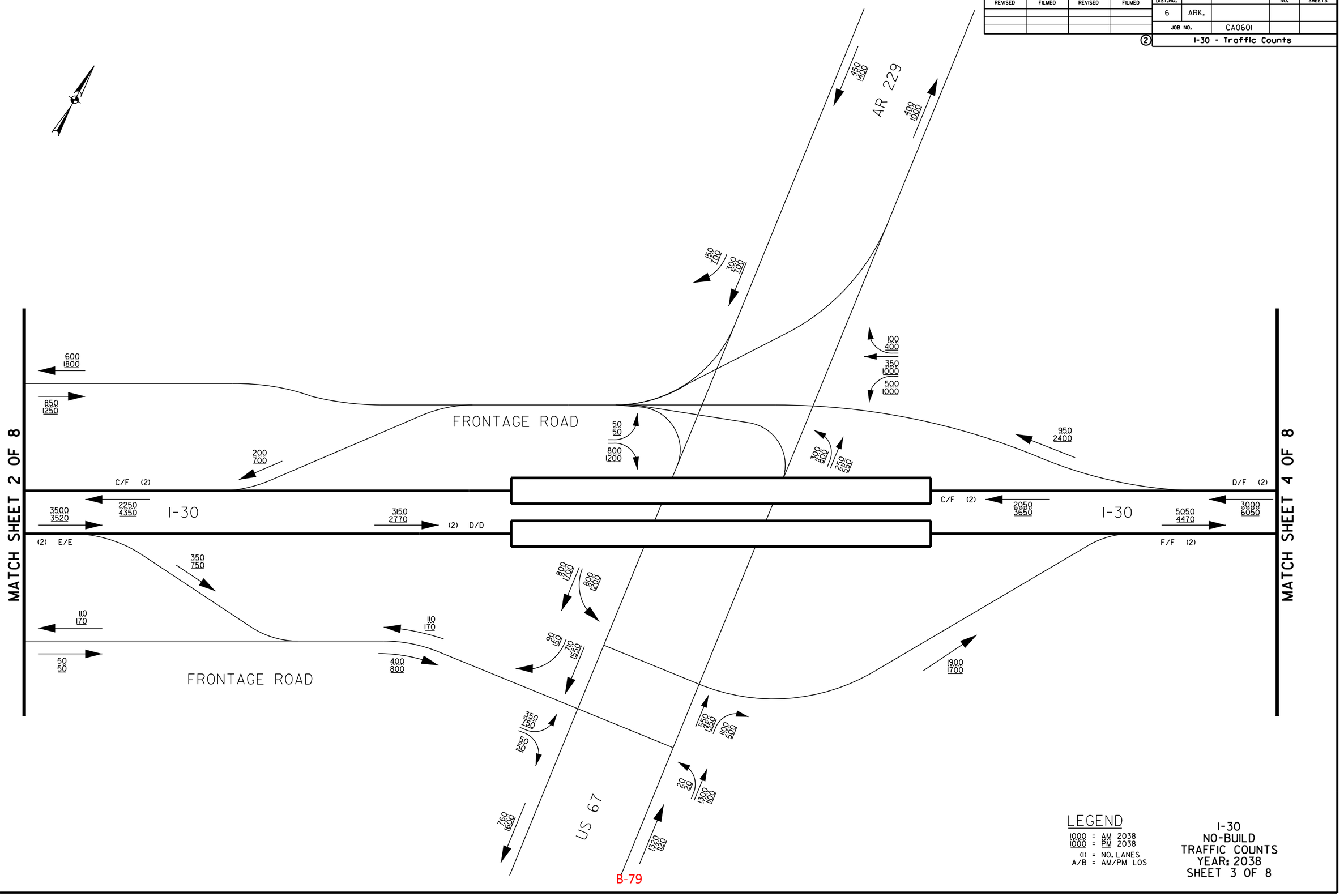

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 3 OF 8

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

8/24/2015 7:08:09 PM
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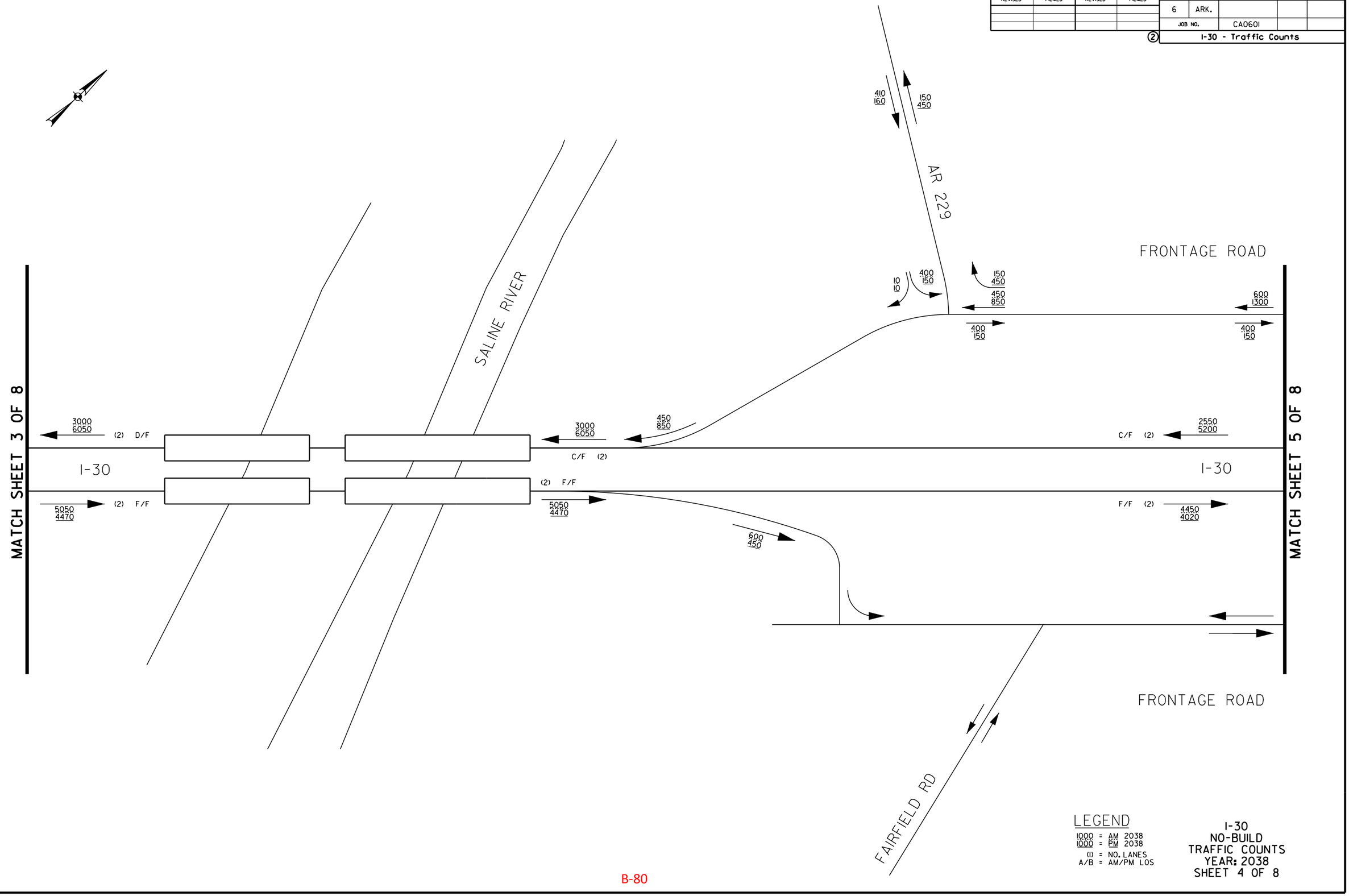


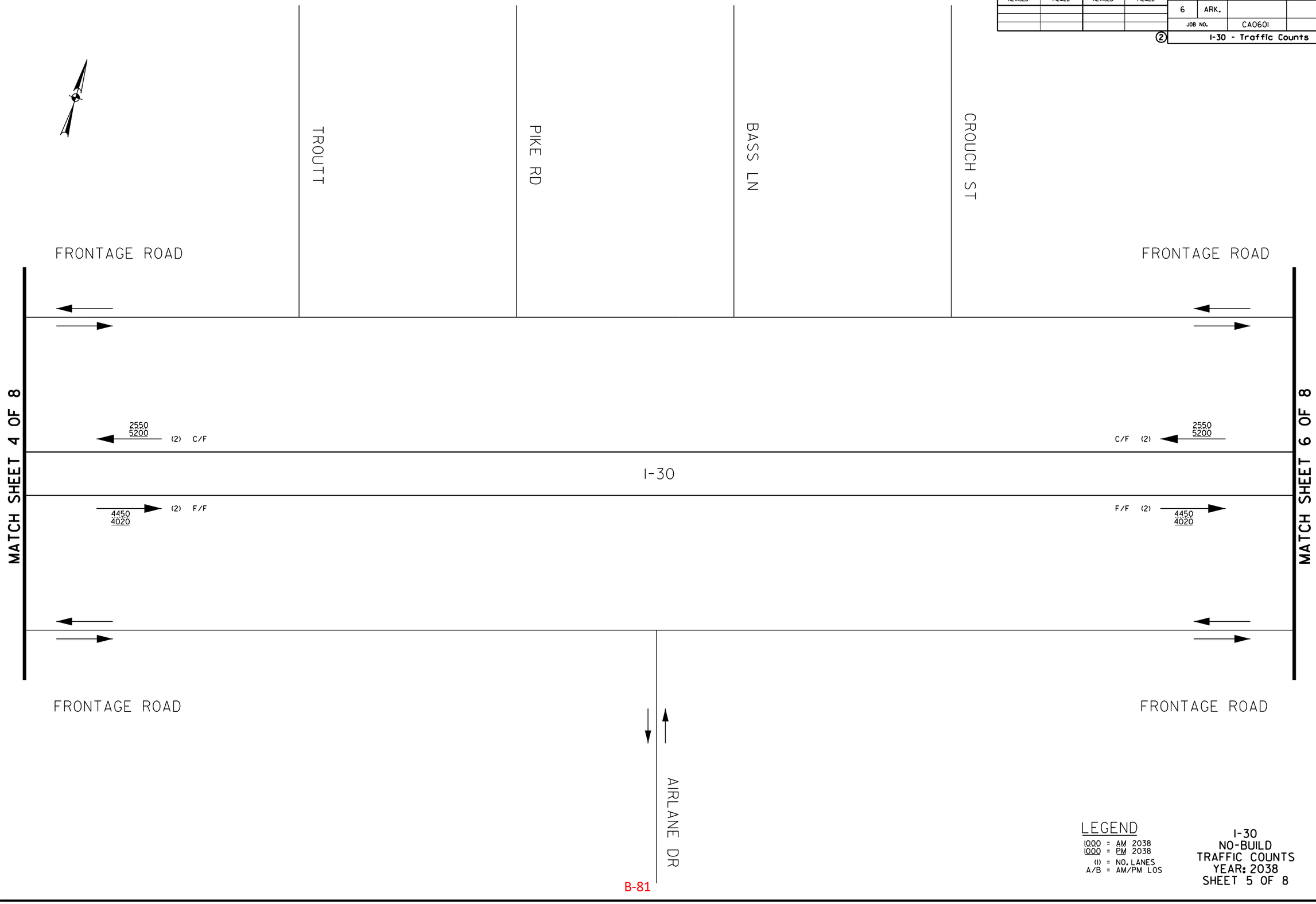
LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 4 OF 8

S:\4407\0\DGN\Plans_Non-PS&E\Traffic Counts\Exist - 2038\4407_TrafficCounts04.2038.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 5 OF 8

7:08:10 PM 8/24/2015 mtrippett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
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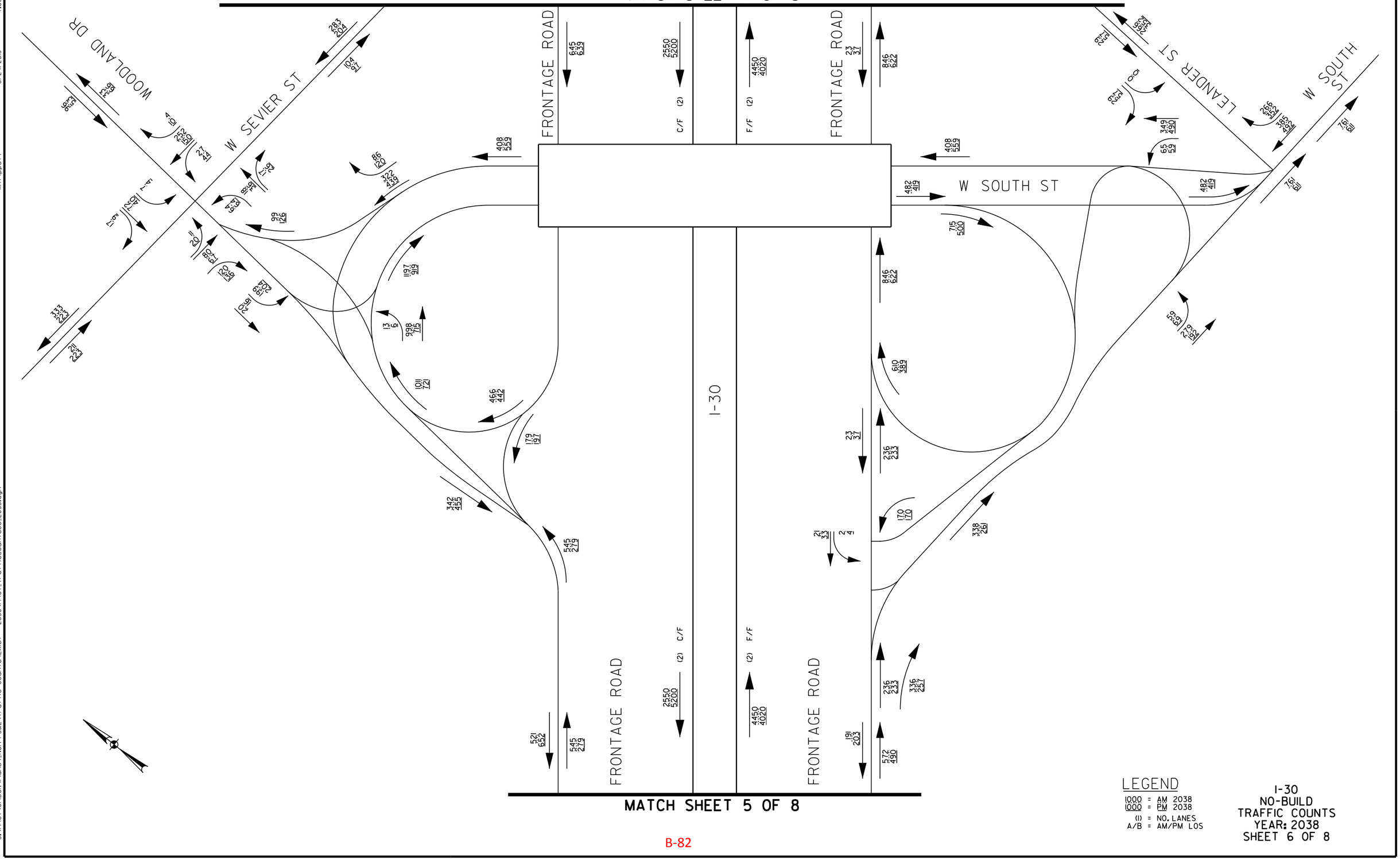
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



MATCH SHEET 5 OF 8

LEGEND

|1000| = AM 2038
|1000| = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 6 OF 8

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mtrippett

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 - Traffic Counts

MATCH SHEET 6 OF 8

MATCH SHEET 8 OF 8

W SEVIER ST

MCNEIL CREEK

EDGEMOOR TERRACE

PINEWOOD DR

FRONTAGE ROAD

104 / 97

283 / 204

824 / 746

374 / 246

645 / 639

541 / 542

2550 / 5200 (2) C/F

B/D (3) 2550 / 5200

450 / 500

C/E (3) 3000 / 5700

I-30

4450 / 4020 (2) F/F

4450 / 4020 (2) F/F

1050 / 920

D/D (3) 5500 / 4940

MCNEIL CREEK

FRONTAGE ROAD

20 / 30

0 / 0

20 / 30

817 / 565

29 / 57

3 / 1

263 / 345

940 / 840

140 / 70

110 / 80

20 / 30

W SEVIER ST

138 / 16

148 / 15

LEANDER ST

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 7 OF 8

S:\14407\01\DGN\Plans_Non-PS&E\Traffic Counts\Exist - 2038\14407_TrafficCounts07_2038.dgn
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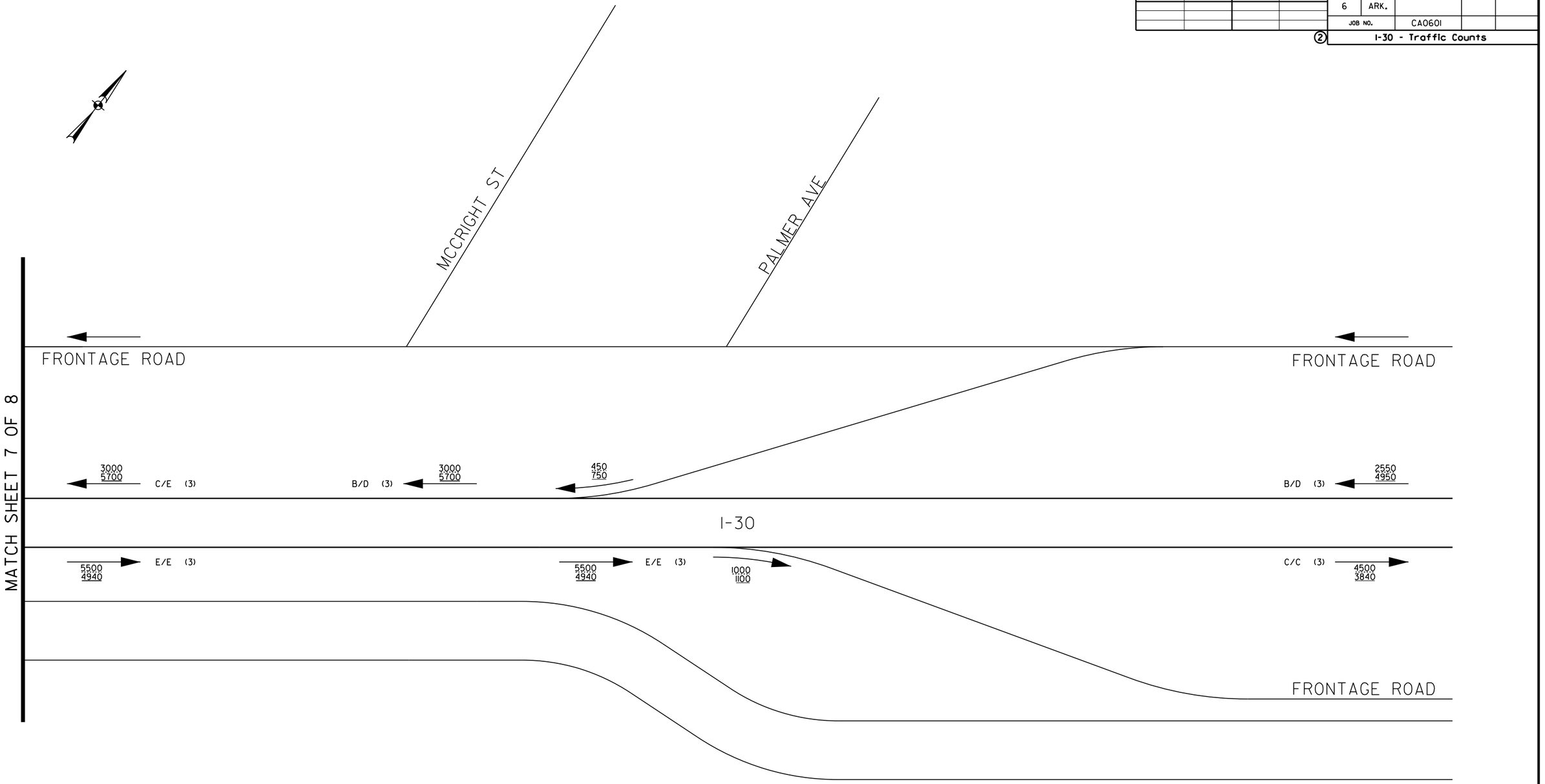
mtrippett

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
NO-BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 8 OF 8

8/24/2015 7:08:11 PM mtrippett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

2 I-30 - Traffic Counts

N BEGGS RD

FRONTAGE ROAD

MATCH SHEET 2 OF 8

2250
4350
B/D (3)

I-30

C/C (3) 3500 3520

C/C (3) 3500 3520

1500
1250

2250
4350
(3) B/D

(2) B/C
2000
2270

FRONTAGE ROAD

FRONTAGE ROAD

S BEGGS RD

750
1800

70
200

1500
2550
B/C (2)

C/D (2)
2070
2470

PAWNEE DR

820
2000

70
200

US 70

1600
1300

1500
1250

PAWNEE VILLAGE DR

PAWNEE DR

100
50

I-30

B/C (2)

B/C (2)

1600
2600

2070
2470

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 1 OF 8

8/24/2015 7:08:11 PM
mtripp ett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
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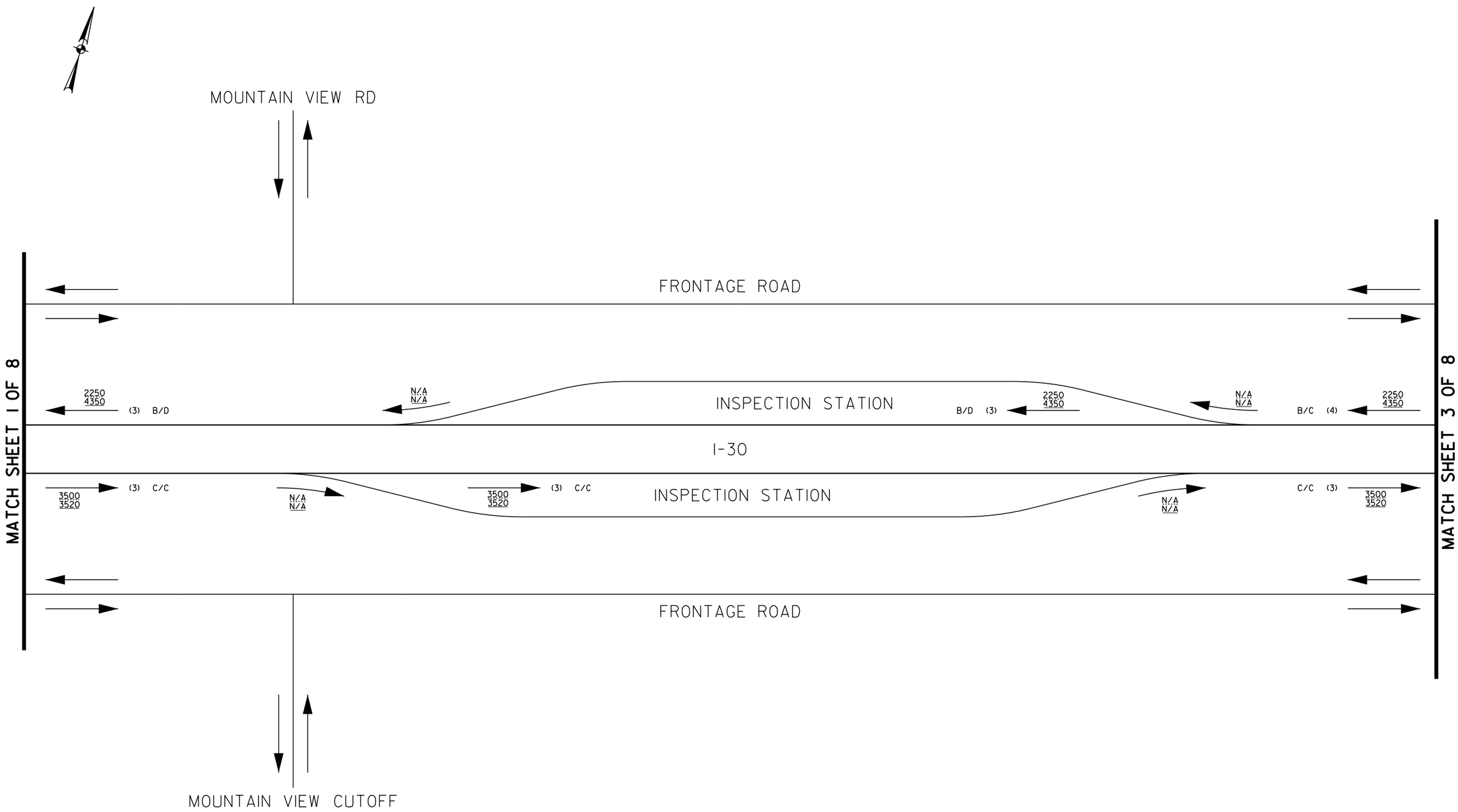
				JOB NO.		CA0601		
				(2)	I-30 - Traffic Counts			



LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 2 OF 8

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mtripplett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

8/24/2015 7:08:12 PM
mtripplett

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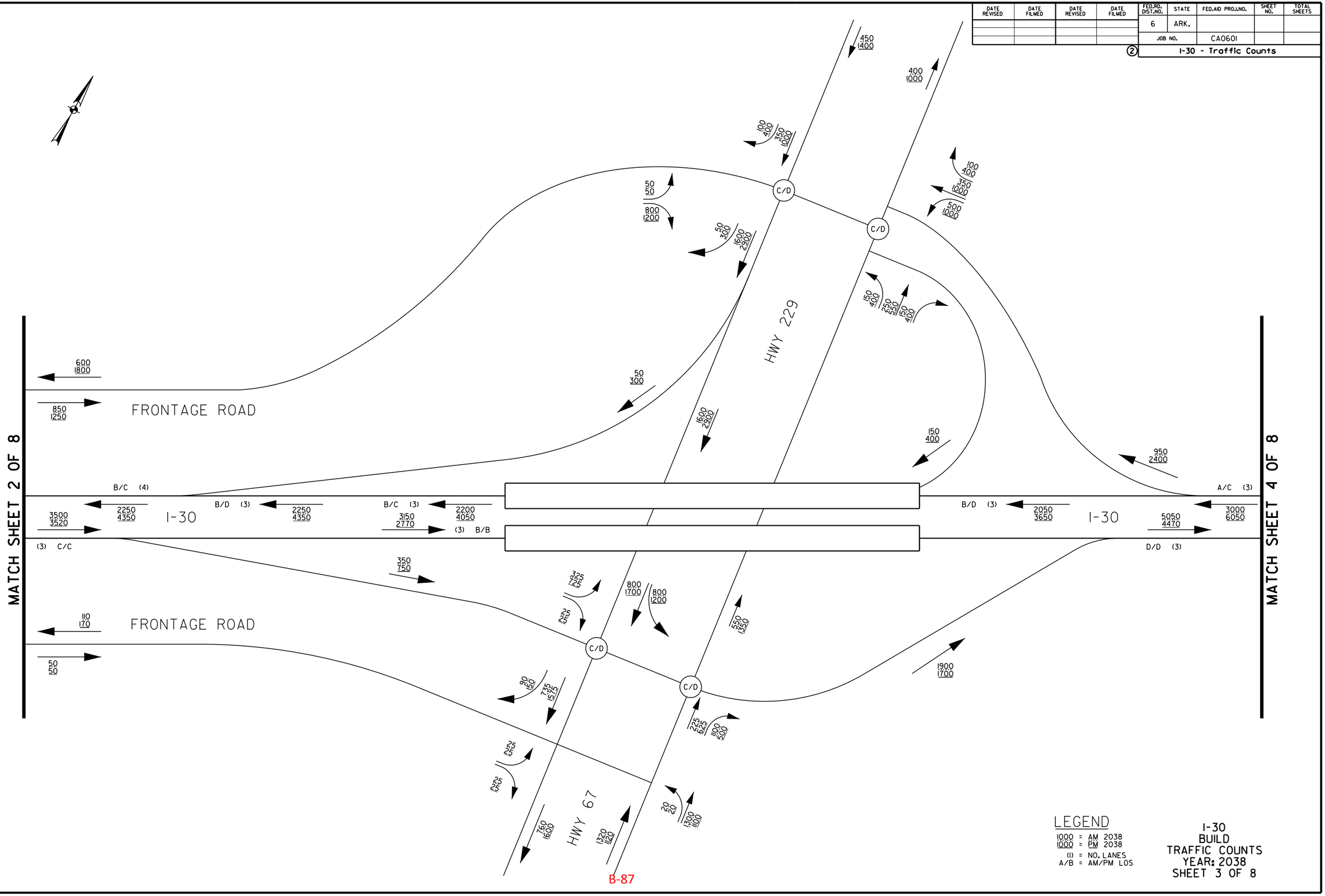

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

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mtrippett

HWY. 229

410
160

150
450

FRONTAGE ROAD

10
10

400
150

150
450

450
850

600
1300

400
150

400
150

SALINE RIVER

MATCH SHEET
SHEET 3 OF 8

3000
6050

(3) B/E

I-30

5050
4470

(3) D/D

3000
6050

450
850

B/E (3)

(3) D/D

5050
4470

600
450

B/D (3)

2550
5200

I-30

C/C (3)

4450
4020

MATCH SHEET
SHEET 5 OF 8

FRONTAGE ROAD

FAIRFIELD RD

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 4 OF 8

S:\14407\0\DGN\Plans_Non-PS&E\Traffic Counts\ALT2 - 2038\14407_TrafficCounts04_Alt_2038.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			

TROUTT

PIKE RD

BASS LN

CROUCH ST

FRONTAGE ROAD

FRONTAGE ROAD

MATCH SHEET 4 OF 8

2550
5200 (3) B/D

B/D (3) 2550
5200

MATCH SHEET 6 OF 8

I-30

4450
4020 (3) C/C

C/C (3) 4450
4020

FRONTAGE ROAD

FRONTAGE ROAD

AIRLANE DR

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 5 OF 8

8/24/2015 7:08:13 PM
mtrippett
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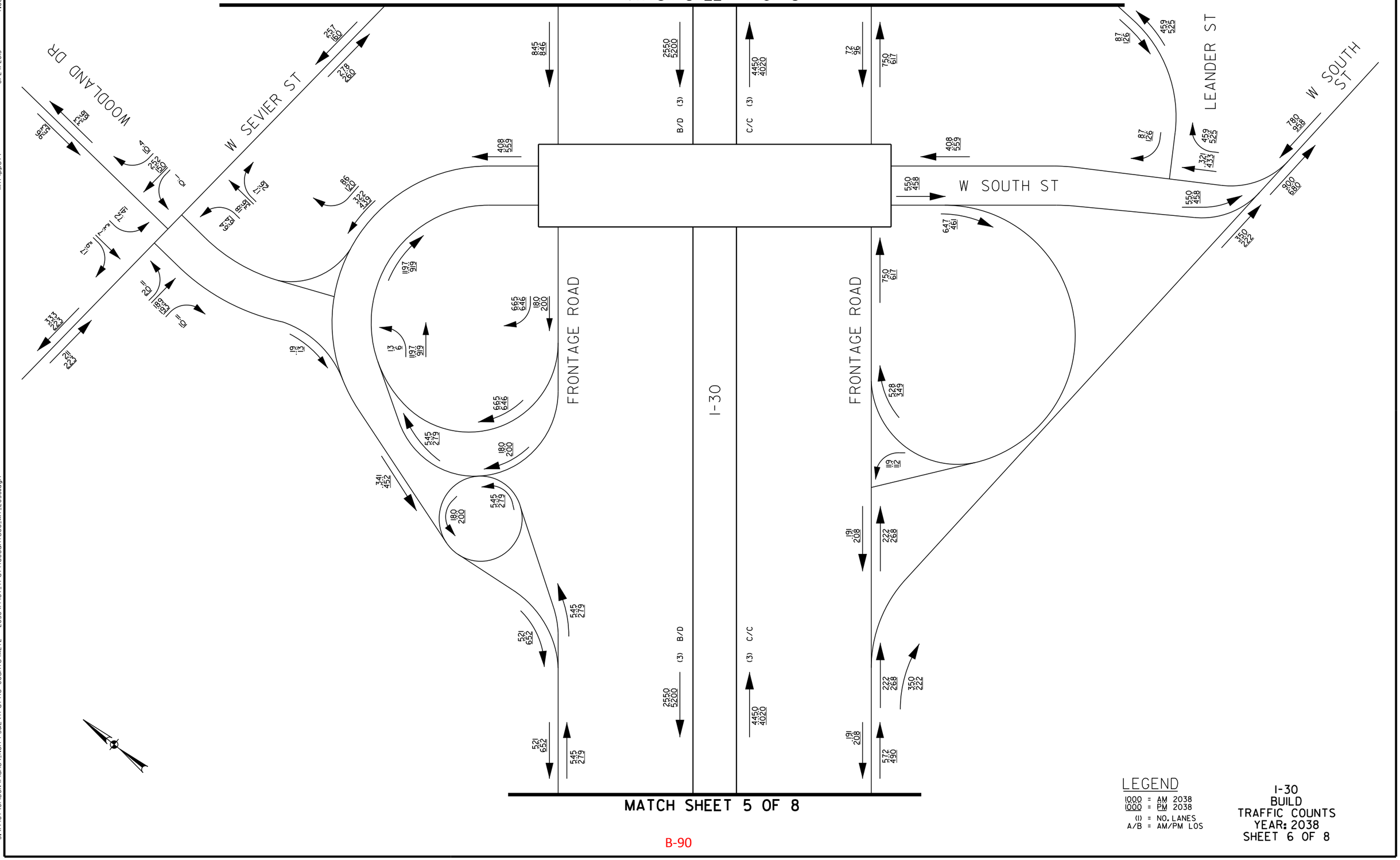
DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



MATCH SHEET 5 OF 8

LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 6 OF 8

8/24/2015 7:08:13 PM mtripplett
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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 - Traffic Counts

MATCH SHEET 6 OF 8

MATCH SHEET 8 OF 8

W SEVIER ST

MCNEIL CREEK

EDGEMOOR TERRACE

PINEWOOD DR

FRONTAGE ROAD

FRONTAGE ROAD

I-30

LEANDER ST

W SEVIER ST

MCNEIL CREEK

845 / 846

257 / 160

567 / 586

824 / 746

374 / 246

2550 / 5200 (3) B/D

B/D (3) 2550 / 5200

450 / 500

C/E (3) 3000 / 5700

4450 / 4020 (3) C/C

4450 / 4020 (3) C/C

1050 / 920

E/D (3) 5500 / 4940

72 / 96

750 / 617

663 / 491

87 / 126

72 / 96

387 / 429

1050 / 920

87 / 126

459 / 525

LEGEND

1000 / 1000 = AM 2038 / PM 2038

(1) = NO. LANES

A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 7 OF 8

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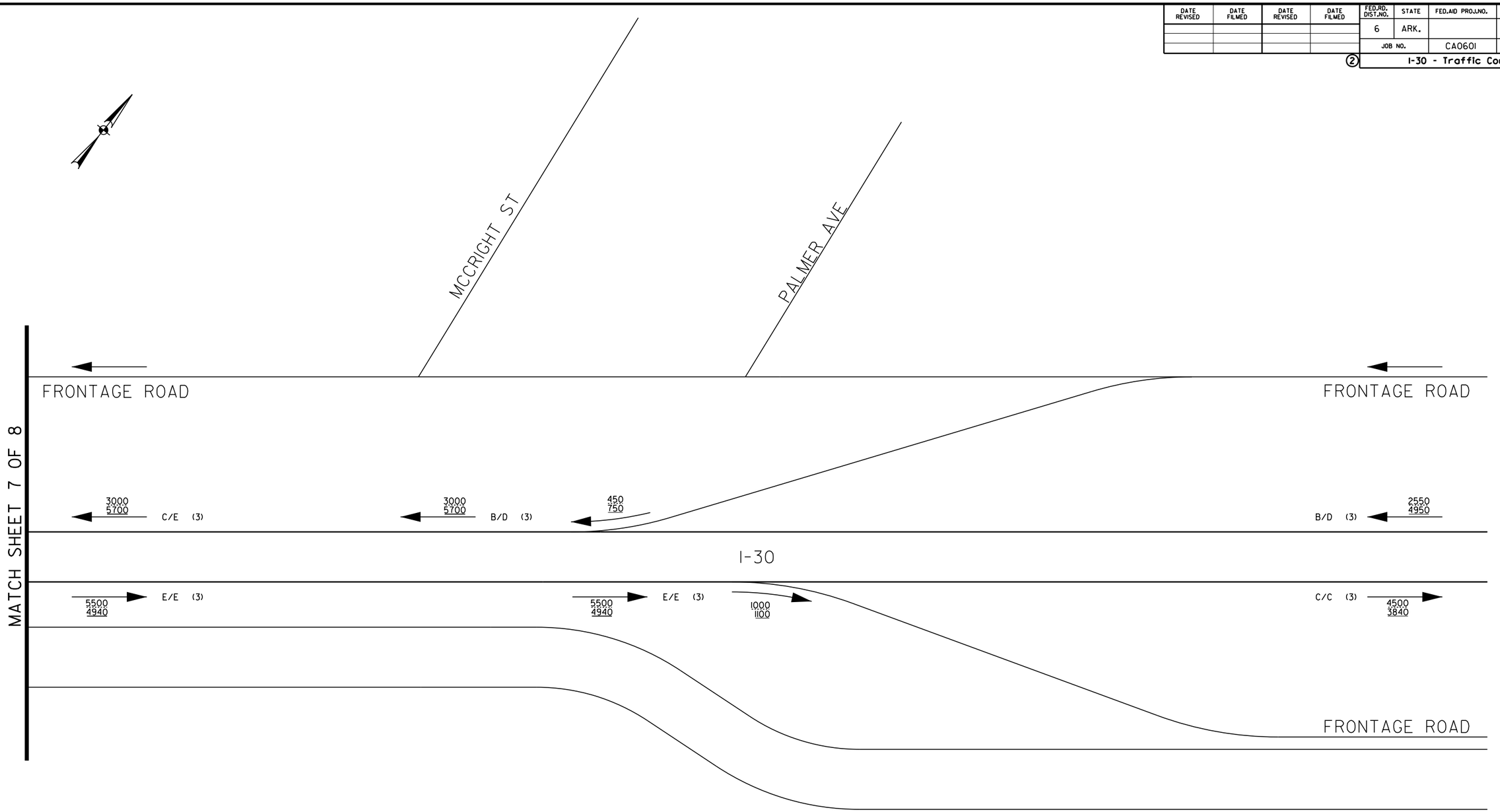
mtrippett

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				②	I-30 - Traffic Counts			



LEGEND

1000 = AM 2038
1000 = PM 2038
(1) = NO. LANES
A/B = AM/PM LOS

I-30
BUILD
TRAFFIC COUNTS
YEAR: 2038
SHEET 8 OF 8

8/24/2015 7:08:14 PM mtrippett
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APPENDIX C – Project Plans

PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	1	23
				②	PLAN STA. 245+00 TO STA. 260+00			

INSTALLATION OF GUARDRAIL

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. I)	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
108+94.16	111+69.16	LT. OF RAMP 1 =	225	1 EACH	1 EACH	
3245+72.08	3248+28.33	LT. OF WB I-30 =	187.5		1 EACH	1 EACH
3245+86.70	3248+80.45	RT. OF WB I-30 =	225		1 EACH	1 EACH

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
249+24.84	269+50.00	A

REMOVAL AND DISPOSAL OF GUARDRAIL

STA.	STA.	LOCATION	UNIT
3248+72	3251+42	LT. OF WB I-30	270 LIN. FT.
3248+87	3252+09	RT. OF WB I-30	322 LIN. FT.

C.L. RAMP 3 CURVE 1
P.I. = 310+75.64
DELTA = 57°48'16" LT.
DOC = 6°00'00"
T = 527.20'
L = 963.41'
P.C. = 305+48.44
P.T. = 315+11.85
Ls = 350.00'
e = -0.092 '/'

C.L. FRONTAGE ROAD B
P.I. = 11+48.53
DELTA = 1°17'05" LT.

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

BEGIN JOB CA0601
STA. 248+88.06
LOG MILE 110.88

STA. 312+10.00
MATCH EXISTING PAVEMENT
BEGIN RECONSTRUCTION

STA. 3249+08.78
BEGIN RECONSTRUCTION
MATCH EXISTING PAVEMENT

STA. 249+24.84
BEGIN CONC. BARR. WALL (MEDIAN TY. A)

STA. 10+94.80, 29.29' RT.
BEGIN CONC. BARR. WALL (SIDE TY. A)

STA. 11+10.00
BEGIN CONSTRUCTION
MATCH EXISTING PAVEMENT

BEGIN CONC. BARR. WALL (SIDE TY. A)
STA. 317+00.00

STA. 252+20 TO STA. 260+00 - IN PLACE
780 LIN. FT. WRSF LT. OF C.L. I-30 MEDIAN REMOVE

STA. 2249+24.96
BEGIN RECONSTRUCTION
MATCH EXISTING PAVEMENT

EB I-30 STA. 225I+51.67, 28.50' RT. =
C.L. RAMP I STA. 100+00.00

STA. 253+85 - IN PLACE
30" X 326' R.C. PIPE CULVERT
WITH HDWL. RT. & 'L' HDWL. LT.
REMOVE HDWL. RT. AND EXTEND R.C. PIPE
6' RT. (CLASS III) (TYPE 3 BEDDING) WITH F.E.S. RT.
30" R.C. PIPE = 10 LIN. FT.
30" F.E.S. = 1 EACH
Q50 = 20.7 CFS D.A. = 6.2 ACRES

STA. 253+85 - CONSTRUCT
DROP INLET 181' LT. H = 4'-6"
WITH 30" R.C. PIPE CULVERT

REMOVE EXISTING DROP INLET = 1 EACH
30" R.C. PIPE = 11 LIN. FT.
TYPE RM DROP INLET = 4'-0" X 3'-0"
STA. 253+85 - CONSTRUCT
DROP INLET 87' LT. H =
ON EXISTING WITH 30" R.C. PIPE CULVERT
4' LT. & 5' RT. (CLASS III) (TYPE 3 BEDDING)
REMOVE EXISTING DROP INLET = 1 EACH
TYPE RM DROP INLET = 4'-0" X 3'-0"

STA. 253+85 - CONSTRUCT
DROP INLET IN MEDIAN H = X'-0"
ON EXISTING WITH 30" R.C. PIPE CULVERT
4' LT. & 16' RT. (CLASS III) (TYPE 3 BEDDING)
REMOVE EXISTING DROP INLET = 1 EACH
TYPE RM DROP INLET = 4'-0" X 3'-0"

REMOVAL & DISPOSAL OF CONCRETE DITCH PAVING

STA.	STA.	LOCATION	UNIT
100+92	102+64	RT. OF RAMP 1	146 SQ. YDS.

REMOVAL & DISPOSAL OF EXISTING CHAIN LINK FENCE

STA.	STA.	LOCATION	UNIT
109+32	111+36	LT. OF RAMP 1	204 LIN. FT.

STA. 248+90 TO STA. 260+00 - IN PLACE
1110 LIN. FT. WRSF. RT. OF C.L. I-30 MEDIAN REMOVE

STA. 106+77 - IN PLACE
36" X 77' R.C. PIPE CULVERT
WITH HDWLS. LT. & RT.
REMOVE HDWL. LT. & EXTEND R.C. PIPE
50' LT. (CLASS III) (TYPE 3 BEDDING)
WITH F.E.S LT.
36" R.C. PIPE = 54 LIN. FT.
36" F.E.S. = 1 EACH

C.L. RAMP 1 CURVE 1
P.I. = 100+90.07
DELTA = 5°24'00" RT.
DOC = 3°00'00"
T = 90.07'
L = 180.00'
P.C. = 100+00.00
P.C.C. = 101+80.00
Ls = N/A
e = N/A

C.L. RAMP 1 CURVE 2
P.I. = 102+51.60
DELTA = 8°34'34" RT.
DOC = 6°00'00"
T = 71.60'
L = 142.94'
P.C.C. = 101+80.00
P.C.C. = 103+22.94
Ls = N/A
e = N/A

C.L. RAMP 1 CURVE 3
P.I. = 103+73.58
DELTA = 12°06'34" RT.
DOC = 12°00'00"
T = 50.64'
L = 100.91'
P.C.C. = 103+22.94
P.C.C. = 104+23.85
Ls = N/A
e = N/A

C.L. RAMP 1 CURVE 6
P.I. = 116+38.45
DELTA = 39°53'59" RT.
DOC = 6°00'00"
T = 346.62'
L = 664.99'
P.C.C. = 112+91.83
P.T. = 119+56.83
Ls = N/A
e = N/A

C.L. RAMP 1 CURVE 5
P.I. = 111+73.78
DELTA = 28°57'53" RT.
DOC = 12°00'00"
T = 123.32'
L = 241.37'
P.C.C. = 110+50.46
P.C.C. = 112+91.83
Ls = N/A
e = N/A

C.L. RAMP 1 CURVE 4
P.I. = 114+71.79
DELTA = 155°05'10" RT.
DOC = 24°45'00"
T = 1047.95'
L = 626.61'
P.C.C. = 104+23.85
P.C.C. = 110+50.46
Ls = N/A
e = 0.100 '/'

STA. 258+57 - IN PLACE
DBL. 4' X 6' X 266' R.C. BOX CULVERT
ON A 3°57' LT. FWD. SKEW
WITH 3:1 WINGS LT. & RT.
AND D.I. 103' LT. - REMOVE
AND D.I. 3.5' LT. - REMOVE
RETAIN & REMOVE WINGS LT. & WING 'B' RT.
& EXTEND R.C. BOX 20'-9" LT.
TO A COMPLETED LENGTH OF 284'-3"
STA. 258+68 - CONSTRUCT
10' X 6' X 284'-" R.C. BOX CULVERT
ON A 3°38' LT. FWD. SKEW
WITH 3:1 WINGS LT. & 3:1 WING 'B' RT.
(SPAN = 21.25')
Q50 = 1175.9 CFS D.A. = 260.5 ACRES

STA. 258+63 - CONSTRUCT
DROP INLET 112' LT. OF C.L. H = 4'-3"
ON EXISTING R.C. BOX CULVERT
AT STA. 258+63
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 258+63 - CONSTRUCT
DROP INLET 16' LT. OF C.L. H = 9'-4"
ON EXISTING R.C. BOX CULVERT
AT STA. 258+63
TYPE TM DROP INLET = 3'-0" X 2'-6"

STA. 113+00.00
END RECONSTRUCTION
MATCH EXISTING PAVEMENT

RETAIN FENCE, GUARDRAIL (TYPE B), CONC. CURB & ISLAND

PROPOSED GUARDRAIL

DBL. 4' X 6' R.C. BOX CULV'T. RETAIN

PLAN MAIN LANES
STA. 245+00 TO STA. 260+00

PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	2	23

② PLAN STA. 260+00 TO STA. 270+00

C.L. FRONTAGE ROAD E CURVE 1
P.I. = 15+29.44
DELTA = 11°47'22" RT.
DOC = 3°45'00"
T = 157.75'
L = 314.39'
P.C. = 13+71.69
P.C.C. = 16+86.07
Ls = 200.00'
e = 0.049 '/'

C.L. FRONTAGE ROAD E CURVE 2
P.I. = 17+82.36
DELTA = 3°22'09" RT.
DOC = 1°45'00"
T = 96.29'
L = 192.53'
P.C.C. = 16+86.07
P.C.C. = 18+78.60
Ls = 200.00'
e = 0.025 '/'

C.L. FRONTAGE ROAD E CURVE 3
P.I. = 19+39.32
DELTA = 3°20'19" RT.
DOC = 2°45'00"
T = 60.72'
L = 121.40'
P.C.C. = 18+78.60
P.T. = 20+00.00
Ls = N/A
e = N/A

C.L. RAMP 3 CURVE 2
P.I. = 324+64.57
DELTA = 24°59'01" RT.
DOC = 3°45'00"
T = 338.49'
L = 666.23'
P.C. = 321+26.08
P.C.C. = 327+92.30
Ls = 400.00'
e = -0.098 '/'

C.L. I-30 MEDIAN CURVE 2
P.I. = 263+73.31
DELTA = 64°29'45" RT.
DOC = 3°00'00"
T = 1204.93'
L = 2149.86'
P.C. = 251+68.37
P.T. = 273+18.23
Ls = N/A
e = N/A

C.L. RAMP 3 CURVE 3
P.I. = 329+46.30
DELTA = 6°09'14" RT.
DOC = 2°00'00"
T = 153.99'
L = 307.69'
P.C.C. = 327+92.30
P.T. = 331+00.00
Ls = N/A
e = -0.098 '/'

STA. 262+01 - IN PLACE
OVERHEAD SIGN STRUCTURE
REMOVE

REMOVAL AND DISPOSAL OF GUARDRAIL

STA.	STA.	LOCATION	UNIT
326I+47	3263+97	RT. OF WB I-30	250 LIN. FT.
316+93	325+93	LT. OF RAMP 3	900 LIN. FT.

STA. 260+00 TO STA. 270+00 - IN PLACE
1000 LIN. FT. WRSF RT. OF C.L. I-30 MEDIAN
REMOVE

STA. 260+00 TO STA. 26I+60 - IN PLACE
160 LIN. FT. WRSF LT. OF C.L. I-30 MEDIAN
REMOVE

STA. 263+55 TO STA. 270+00 - IN PLACE
645 LIN. FT. WRSF LT. OF C.L. I-30 MEDIAN
REMOVE

STA. 261+00 - CONSTRUCT
DROP INLET 16' LT. OF C.L. H = 3'-0"
WITH 24" X 97' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING)
TO DROP INLET AT STA. 262+00 LT.
TYPE RM DROP INLET = 3'-0 X 4'-0"

STA. 263+00 - CONSTRUCT
DROP INLET 16' LT. OF C.L. H = 3'-0"
WITH 24" X 97' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING)
TO DROP INLET AT STA. 262+00 LT.
TYPE RM DROP INLET = 3'-0 X 4'-0"

STA. 262+00 - CONSTRUCT
DROP INLET 16' LT. OF C.L. H = 3'-0"
WITH 30" X 86' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING)
WITH F.E.S. ON RT.
30" F.E.S. = 1 EACH
TYPE RM DROP INLET = 3'-0 X 4'-0"

EB I-30 CURVE 2
P.I. = 226I+48.49
DELTA = 55°00'53" RT.
DOC = 3°05'00"
T = 967.64'
L = 1784.26'
P.C. = 125I+80.84
P.C.C. = 1269+65.II
Ls = 420.00'
e = -0.098 '/'

WB I-30 CURVE 2
P.I. = 3263+78.17
DELTA = 64°29'45" RT.
DOC = 3°10'00"
T = 1141.52'
L = 2036.71'
P.C. = 3252+36.65
P.T. = 3272+73.36
Ls(1) = 450.00'
Ls(2) = 540.00'
e = +0.098 '/'

STA. 262+53 - IN PLACE
DROP INLET 10' LT. OF C.L. H = 3'-5"
WITH 24" X 10I' R.C. PIPE CULVERT
TO DROP INLET AT STA. 26I+50 LT.
REMOVE

STA. 26I+50 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 6'-6"
WITH I8" X 77' R.C. PIPE CULVERT
TO DROP INLET AT STA. 26I+49 RT.
REMOVE

STA. 26I+49 - IN PLACE
DROP INLET 73' RT. OF C.L. H = 2'-9"
WITH I8" X 62' R.C. PIPE CULV'T. OUTLET
WITH HDWL. ON RT.
RETAIN

STA. 19+35.00
END RECONSTRUCTION
MATCH EXISTING PAVEMENT

WB I-30 STA. 3268+67.70, 28.50' LT. =
C.L. RAMP 3 STA. 331+00.00
+03.96
-157.96

STA. 237+80.00
MATCH EXISTING PAVEMENT
BEGIN RECONSTRUCTION

STA. 268+95 - IN PLACE
DROP INLET 96' LT. OF C.L. H = 6'-7" - RETAIN
WITH 48" X 44' R.C. PIPE CULVERT INLET
WITH HDWL. ON LT. - RETAIN
& 48" X 85' R.C. PIPE CULVERT TO
DROP INLET 8' LT. OF C.L. H = I0'-3" - REMOVE
WITH 48" X 84' R.C. PIPE CULVERT TO
DROP INLET 76' RT. OF C.L. H = 5'-0" - REMOVE
WITH 48" X II4' R.C. PIPE CULVERT TO
DROP INLET I89' RT. OF C.L. H = 4'-I0" - RETAIN
WITH 48" X 59' R.C. PIPE CULVERT OUTLET
WITH HDWL. ON RT. - RETAIN
050 = I22.7 CFS D.A. = 48.0 ACRES

C.L. RAMP 2 CURVE 4
P.I. = 234+45.83
DELTA = 6I°52'0I" RT.
DOC = 6°00'00"
T = 572.27'
L = I03I.I2'
P.C. = 228+73.56
P.T. = 239+04.67
Ls = 250.00'
e = -0.070 '/'

STA. 268+95 - CONSTRUCT
DROP INLET IN MEDIAN H = I2'-6"
CONNECT TO EXISTING PIPE
WITH 48" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
48" R.C. PIPE CULVERT = I0 LIN. FT.
TYPE RM DROP INLET = 5'-0" X 4'-0"

STA. 268+95 - CONSTRUCT
DROP INLET 84' RT. OF C.L. H = 6'-I0"
CONNECT TO EXISTING PIPE
WITH 48" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
48" R.C. PIPE CULVERT = I7 LIN. FT.
TYPE RM DROP INLET = 5'-0" X 3'-0"

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
249+24.84	267+29.73	A
267+29.73	268+29.73	SP-I
268+47.73	269+47.73	SP-I
269+47.73	27I+I0.00	B
27I+I0.00	274+50.00	C

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

EB I-30 CURVE 3
P.I. = 2272+02.68
DELTA = 9°28'52" RT.
DOC = 2°00'00"
T = 237.57'
L = 474.05'
P.C.C. = 2269+65.II
P.T. = 2274+39.I6
Ls = 350.00'
e = -0.070 '/'

PLAN MAIN LANES
STA. 260+00 TO STA. 270+00

PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	3	23

(2) PLAN STA. 270+00 TO STA. 285+00

WB I-30 CURVE 2
P.I. = 3263+78.17
DELTA = 64°29'45" RT.
DOC = 3°10'00"
T = 1141.52'
L = 2036.71'
P.C. = 3252+36.65
P.T. = 3272+73.36
Ls(1) = 450.00'
Ls(2) = 540.00'
e = +0.098 '/'

INSTALLATION OF GUARDRAIL			GUARDRAIL (TY. A)	GUARDRAIL TERMINAL	GUARDRAIL TERMINAL
STA.	STA.	LOCATION	LIN. FT.	(TY. 1)	(TY. 2)
3271+25.00	3273+43.75	LT. OF WB I-30 =	150	1 EACH	1 EACH
281+81.25	284+00.00	RT. OF EB I-30 =	150	1 EACH	1 EACH

CONCRETE BARRIER WALL		
STA.	STA.	MEDIAN TYPE
269+47.73	271+10.00	B
271+10.00	274+50.00	C
274+50.00	277+23.37	B
277+23.37	375+77.09	A

STA. 270+00 TO STA. 285+00 - IN PLACE
1500 LIN. FT. WRSF LT. OF C.L. I-30 MEDIAN
REMOVE

STA. 270+00 TO STA. 275+50 - IN PLACE
550 LIN. FT. WRSF RT. OF C.L. I-30 MEDIAN
REMOVE

TRIBUTARY TO TRACE CREEK

C.L. I-30 MEDIAN STA. 279+65.50, 13.00' LT. =
WB I-30 STA. 3280+00.00

C.L. I-30 MEDIAN STA. 280+21.70, 13.00' RT. =
EB I-30 STA. 2280+00.00

+12.41
-157.82

+98.19
-158.36

EXIST. R/W

PROPOSED GUARDRAIL

CONC. BARR. WALL (SIDE TY. E)

CONC. BARR. WALL (SIDE TY. A)

P.I. 2272+02.68 EB I-30

P.T. 3272+73.36 WB I-30

P.T. 273+18.23 I-30 MEDIAN

30" R.C.P. RETAIN

FRONTAGE ROAD B

CONST. LIMIT

CONC. BARR. WALL (MEDIAN TY. B)

CONC. BARR. WALL (MEDIAN TY. C)

CONC. BARR. WALL (MEDIAN TY. A)

C.L. I-30 MEDIAN

WB I-30

EB I-30

NOSE 2276+56.13 26.00' RT.

N76°48'32"E

N83°6'21"E

N86°17'23"E

RAMP 2

C.L. RAMP 2

CONST. LIMIT

FRONTAGE ROAD A

CONC. BARR. WALL (SIDE TY. A)

CONC. BARR. WALL (SIDE TY. E)

PROPOSED GUARDRAIL

P.C.C. 2269+65.11 EB I-30

SAWCUT

STA. 237+80.00
MATCH EXISTING PAVEMENT
BEGIN RECONSTRUCTION

MATCH EXISTING

P.T. 239+04.67 RAMP 2

P.T. 2274+39.16 EB I-30

P.C. 241+49.82 RAMP 2

P.I. 243+62.15 RAMP 2

P.T. 245+74.37 RAMP 2

C.L. I-30 MEDIAN STA. 280+03.00, 41.50' RT. =
C.L. RAMP 2 STA. 245+74.37

+98.61
141.64

+56.66
177.29

+21.07
253.90

EXIST. R/W

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

EB I-30 CURVE 2
P.I. = 2261+48.49
DELTA = 55°00'53" RT.
DOC = 3°05'00"
T = 967.64'
L = 1784.26'
P.C. = 1251+80.84
P.C.C. = 1269+65.11
Ls = 420.00'
e = -0.098 '/'

EB I-30 CURVE 3
P.I. = 2272+02.68
DELTA = 9°28'52" RT.
DOC = 2°00'00"
T = 237.57'
L = 474.05'
P.C.C. = 2269+65.11
P.T. = 2274+39.16
Ls = 350.00'
e = -0.070 '/'

C.L. RAMP 2 CURVE 4
P.I. = 234+45.83
DELTA = 61°52'01" RT.
DOC = 6°00'00"
T = 572.27'
L = 1031.12'
P.C. = 228+73.56
P.T. = 239+04.67
Ls = 250.00'
e = -0.070 '/'

C.L. RAMP 2 CURVE 5
P.I. = 243+62.15
DELTA = 3°11'03" RT.
DOC = 00°45'00"
T = 212.33'
L = 424.55'
P.C. = 241+49.82
P.T. = 245+74.37
Ls = N/A
e = N/A

STA. 271+04 - CONSTRUCT
DROP INLET 2' LT. OF C.L. H = 5'-0"
WITH 24" X 206' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 268+95 LT.
TYPE RM DROP INLET = 3'-0" X 4'-0"

STA. 273+56 - CONSTRUCT
DROP INLET 2' LT. OF C.L. H = 5'-0"
WITH 18" X 247' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 271+04 LT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 278+93 - IN PLACE
DROP INLET 80' LT. OF C.L. H = 3'-6" - RETAIN
WITH 30" X 69' R.C. PIPE CULVERT INLET
WITH HDWL. LT.
AND 30" X 68' R.C. PIPE CULVERT OUTLET TO
DROP INLET 8' LT. OF C.L. H = 5'-7" - REMOVE
WITH 30" X 76' R.C. PIPE CULVERT OUTLET TO
DROP INLET 72' RT. OF C.L. H = 4'-9" - REMOVE
WITH 30" X 61' R.C. PIPE CULVERT OUTLET
WITH HDWL. RT.
RETAIN
Q50 = 22.4 CFS D.A. = 5.4 ACRES

STA. 278+93 - CONSTRUCT
JUNCTION BOX 8' LT. H = 8'-2"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE CULVERT = 8 LIN. FT.
TYPE ST JUNCTION BOX = 3'-6" X 3'-0"

STA. 278+93 - CONSTRUCT
DROP INLET 79' RT. H = 6'-8"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE CULVERT = 14 LIN. FT.
TYPE RM DROP INLET = 4'-0" X 3'-0"

PLAN MAIN LANES
STA. 270+00 TO STA. 285+00

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PRELIMINARY

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	4	23

(2) **PLAN STA. 285+00 TO STA. 300+00**

STA. 288+91 - IN PLACE
DROP INLET 9' LT. OF C.L. H = 5'-0" - REMOVE
WITH 30" X 75' R.C. PIPE CULVERT INLET
ON A 30° LT. FWD. SKEW
WITH TYPE I GRATE ON LT. - REMOVE
AND 30" X 85' R.C. PIPE CULVERT OUTLET TO
DROP INLET 80' RT. OF C.L. H = 3'-6" - RETAIN
WITH 30" X 48' R.C. PIPE CULVERT OUTLET
WITH HDWL. ON RT. - RETAIN
050 = 34.0 CFS D.A. = 9.4 ACRES

STA. 288+91 - CONSTRUCT
TYPE I GRATE 77' LT. OF C.L.
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE CULVERT = 7 LIN. FT.
TYPE I GRATE = 15'-6" X 4'-0"

STA. 288+91 - CONSTRUCT
JUNCTION BOX 9' LT. OF C.L. H = 9'-6"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE CULVERT = 12 LIN. FT.
TYPE ST JUNCTION BOX = 4'-0" X 3'-0"

STA. 289+55 - IN PLACE
30" X 55' R.C. PIPE CULVERT
WITH HDWLS. ON LT. & RT.
RETAIN

N. BEGGS RD.

STA. 285+00 TO STA. 300+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

STA. 293+50 - CONSTRUCT
OVERHEAD SIGN STRUCTURE
NO. OH-030-XX-STA293+50WB

INSTALLATION OF GUARDRAIL STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. I)	GUARDRAIL TERMINAL (TY. 2)
293+20	295+95	LT. OF WB I-30 =	225	I EACH	I EACH

STA. 297+13 - IN PLACE
DROP INLET 83' LT. OF C.L. H = 3'-3" - RETAIN
WITH 30" X 65' R.C. PIPE CULVERT INLET
WITH HDWL. ON LT. - RETAIN
AND 30" X 68' R.C. PIPE CULVERT OUTLET TO
DROP INLET 10' LT. OF C.L. H = 5'-4" - REMOVE
WITH 30" X 88' R.C. PIPE CULVERT OUTLET TO
DROP INLET 81' RT. OF C.L. H = 3'-1" - RETAIN
WITH 30" X 51' R.C. PIPE CULVERT OUTLET
WITH HDLW. ON RT. - RETAIN
RETAIN
050 = 36.4 CFS D.A. = 9.3 ACRES

STA. 297+13 - CONSTRUCT
JUNCTION BOX 10' LT. OF C.L. H = 7'-5"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE CULVERT = 8 LIN. FT.
TYPE ST JUNCTION BOX = 3'-6" X 3'-0"

+96.72
-160.93

EXIST. R/W

30" R.C.P. RETAIN

FRONTAGE ROAD B

PROPOSED GUARDRAIL

CONST. LIMIT

10' 36' 26' 12' 12' 36' 10'

285 290 295 300

C.L. I-30 MEDIAN

2'

N86°17'23"E

CONC. BARR. WALL (SIDE TY. E)
CONC. BARR. WALL (SIDE TY. A)
CONC. BARR. WALL (MEDIAN TY. A)
CONC. BARR. WALL (SIDE TY. E)
CONC. BARR. WALL (SIDE TY. A)

+70 +50 +25 +75 +40

30" R.C.P. RETAIN

FRONTAGE ROAD A

CONST. LIMIT

EXIST. R/W

+96.82
139.07

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
285+00	285+00	15'	RT.	7'	11.67
285+50	285+50	15'	RT.	7'	11.67
286+00	286+00	15'	RT.	7'	11.67
286+50	286+50	15'	RT.	7'	11.67
287+00	287+00	15'	RT.	7'	11.67
287+50	287+50	15'	RT.	7'	11.67
288+00	288+00	15'	RT.	7'	11.67
288+50	288+50	15'	RT.	7'	11.67
289+00	289+00	15'	RT.	7'	11.67
289+50	289+50	15'	RT.	7'	11.67
290+00	290+00	15'	RT.	7'	11.67
290+50	290+50	15'	RT.	7'	11.67
291+50	291+50	15'	RT.	7'	11.67
296+50	296+50	15'	RT.	7'	11.67
297+00	297+00	15'	RT.	7'	11.67
297+50	297+50	15'	RT.	7'	11.67

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

CONCRETE BARRIER WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
284+00	284+70	A
284+70	291+50	E
291+50	296+25	A
296+25	297+75	E
297+75	300+40	A

S. BEGGS RD.

B-97

PLAN MAIN LANES
STA. 285+00 TO STA. 300+00

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AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	5	23

(2) PLAN STA. 300+00 TO STA. 315+00

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STA. 306+65 - IN PLACE
DROP INLET 88' LT. OF C.L. H = 4'-0" - RETAIN
WITH 30" X 68' R.C. PIPE CULVERT INLET
ON A 30° RT. FWD. SKEW
WITH HDWL. ON LT. - RETAIN
AND 30" X 84' R.C. PIPE CULVERT OUTLET
ON A 30° RT. FWD. SKEW TO
STA. 306+65 - IN PLACE
DROP INLET 11' LT. OF C.L. H = 8'-9" - REMOVE
WITH 30" X 96' R.C. PIPE CULVERT OUTLET
ON A 30° RT. FWD. SKEW TO
STA. 307+58 - IN PLACE
DROP INLET 76' RT. OF C.L. H = 4'-8" - RETAIN
WITH 30" X 60' R.C. PIPE CULVERT OUTLET
ON A 30° RT. FWD. SKEW
WITH HDWL. ON RT. - RETAIN
RETAIN
Q50 = 50.2 CFS D.A. = 13.8 ACRES

STA. 307+09 - CONSTRUCT
JUNCTION BOX 11' LT. OF C.L. H = 12'-0"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 2 BEDDING)
30" R.C. PIPE CULVERT = 13 LIN. FT.
TYPE ST JUNCTION BOX = 4'-0" X 3'-0"

STA. 314+88 - IN PLACE
DROP INLET 90' LT. OF C.L. H = 3'-8" - RETAIN
WITH 18" X 55' R.C. PIPE CULVERT INLET
WITH HDWL. ON LT.
AND 18" X 76' R.C. PIPE CULVERT OUTLET TO
DROP INLET 10' LT. OF C.L. H = 4'-7" - REMOVE
WITH 18" X 69' R.C. PIPE CULVERT OUTLET TO
DROP INLET 63' RT. OF C.L. H = 2'-10" - REMOVE
WITH 18" X 58' R.C. PIPE CULVERT OUTLET
WITH HDWL. ON RT.
RETAIN
Q50 = 22.7 CFS D.A. = 4.4 ACRES

STA. 314+88 - CONSTRUCT
JUNCTION BOX 10' LT. OF C.L. H = 7'-9"
CONNECT TO EXISTING PIPE
WITH 18" R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
18" R.C. PIPE CULVERT = 10 LIN. FT.
TYPE ST JUNCTION BOX = 3'-0" X 3'-0"

STA. 314+88 - CONSTRUCT
DROP INLET 69' RT. OF C.L. H = 4'-3"
CONNECT TO EXISTING PIPE
WITH 18" R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
18" R.C. PIPE CULVERT = 18 LIN. FT.
TYPE RM DROP INLET = 4'-0" X 3'-0"

HERZFELD BLVD.

EXIST. R/W

FRONTAGE ROAD B

30" R.C.P. RETAIN

18" R.C.P. RETAIN

CONST. LIMIT

10' 36' 6' 26' 12' 12' 36' 10'

C.L. I-30 MEDIAN

N86°17'23"E

300 305 310 315

+40 +80

CONC. BARR. WALL (SIDE TY. E)

CONC. BARR. WALL (MEDIAN TY. A)

CONC. BARR. WALL (SIDE TY. A)

FRONTAGE ROAD A

EXIST. R/W

STA. 300+00 TO STA. 315+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

CONCRETE BARRIER WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
297+75	300+40	A
300+40	308+80	E
308+80	316+25	A

BRAGG PL.

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
300+75	300+75	15'	RT.	7'	11.67
301+25	301+25	15'	RT.	7'	11.67
301+75	301+75	15'	RT.	7'	11.67
302+25	302+25	15'	RT.	7'	11.67
302+75	302+75	15'	RT.	7'	11.67
303+25	303+25	15'	RT.	7'	11.67
303+75	303+75	15'	RT.	7'	11.67
304+25	304+25	15'	RT.	7'	11.67
304+75	304+75	15'	RT.	7'	11.67
305+25	305+25	15'	RT.	7'	11.67
305+75	305+75	15'	RT.	7'	11.67
306+25	306+25	15'	RT.	7'	11.67
306+75	306+75	15'	RT.	7'	11.67
307+25	307+25	15'	RT.	7'	11.67
307+75	307+75	15'	RT.	7'	11.67
308+25	308+25	15'	RT.	7'	11.67
308+75	308+75	15'	RT.	7'	11.67

PLAN MAIN LANES
STA. 300+00 TO STA. 315+00

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	6	23

(2) PLAN STA. 315+00 TO STA. 330+00

DOBBS CREEK

STA. 320+78 - IN PLACE
DBL. 8' X 8' X 256' R.C. BOX CULVERT
(SPAN = 17.79')
WITH 3:1 WINGS LT. & RT.
AND DROP INLET 94' LT. OF C.L. - RETAIN
AND DROP INLET 8' LT. OF C.L. - REMOVE
AND DROP INLET 77' RT. OF C.L. - RETAIN
RETAIN & REMOVE WINGS LT. & RT.
AND EXTEND R.C. BOX 8'-5" LT. & 8'-1" RT.
TO A COMPLETED LENGTH OF 272'
STA. 320+92 - CONSTRUCT
8' X 8' X 272' R.C. BOX CULVERT
(SPAN = 27.54')
WITH 3:1 WINGS LT. & RT.
Q50 = 2470.2 CFS D.A. = 806.7 ACRES

C.L. I-30 MEDIAN CURVE 3
P.I. = 335+56.36
DELTA = 13°11'56" LT.
DOC = 0°30'00"
T = 1325.76'
L = 2639.78'
P.C. = 322+30.60
P.T. = 348+70.38
Ls = N/A
e = N.C.

STA. 320+00 - CONSTRUCT
OVERHEAD SIGN STRUCTURE
NO. OH-030-XX-STA320+00WB

INSTALLATION OF GUARDRAIL			GUARDRAIL (TY. A)	GUARDRAIL TERMINAL (TY. 1)	GUARDRAIL TERMINAL (TY. 2)
STA.	STA.	LOCATION	LIN. FT.		
319+70	322+45	LT. OF WB I-30 =	225	1 EACH	1 EACH

OBLITERATE EXISTING ROADWAY
× REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

+00.00 -200.00
+00.00 -159.02
+45.00 -175.00
+45.00 -158.98
T.C.E.
PROP. R/W
+20.00 -175.00
+20.00 -158.92
+75.00 -200.00
+75.00 -158.88
+19.22 -158.85
EXIST. R/W

FRONTAGE ROAD B

CONST. LIMIT

P.C. 322+30.60 I-30 MEDIAN

300' TAPER

+13.65

10' 36' 26' 12' 12' 2' 12' 36' 10'

315 320 325 330

N86°17'23"E

C.L. I-30 MEDIAN

+25 +50

CONC. BARR. WALL (SIDE TY. A)
CONC. BARR. WALL (SIDE TY. E)
CONC. BARR. WALL (MEDIAN TY. A)
CONC. BARR. WALL (SIDE TY. A)

CONST. LIMIT

48' 6'

FRONTAGE ROAD A

EXIST. R/W

+45.00 141.02
+45.00 155.00
PROP. R/W
T.C.E.
T.C.E.
+25.00 141.08
+25.00 155.00
+18.99 141.15
+75.00 200.00
+10.00 200.00

J K DR.

+54.47
+54.47
200' TAPER
650' DECEL. LANE

CONCRETE BARRIER WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
308+80.00	316+25.00	A
316+25.00	323+50.00	E
323+50.00	332+74.41	A

STA. 315+00 TO STA. 330+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

DOBBS CREEK

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
316+60	316+60	15'	RT.	7'	11.67
317+10	317+10	15'	RT.	7'	11.67
317+60	317+60	15'	RT.	7'	11.67
318+10	318+10	15'	RT.	7'	11.67
318+60	318+60	15'	RT.	7'	11.67
319+10	319+10	15'	RT.	7'	11.67
319+60	319+60	15'	RT.	7'	11.67
320+10	320+10	15'	RT.	7'	11.67
320+60	320+60	15'	RT.	7'	11.67
321+10	321+10	15'	RT.	7'	11.67
321+60	321+60	15'	RT.	7'	11.67
322+10	322+10	15'	RT.	7'	11.67
322+60	322+60	15'	RT.	7'	11.67
323+10	323+10	15'	RT.	7'	11.67

PLAN MAIN LANES
STA. 315+00 TO STA. 330+00

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	7	23

(2) PLAN STA. 330+00 TO STA. 345+00

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C.L. I-30 MEDIAN CURVE 3
P.I. = 335+56.36
DELTA = 13°11'56" LT.
DOC = 0°30'00"
T = 1325.76'
L = 2639.78'
P.C. = 322+30.60
P.T. = 348+70.38
Ls = N/A
e = N.C.

STA. 332+86 - IN PLACE
24" X 45' R.C. PIPE CULVERT
WITH HDWLS. LT. & RT.
REMOVE

STA. 332+86 - IN PLACE
DROP INLET 7' LT. OF C.L. H = 5'-7"
WITH 24" X 71' R.C. PIPE CULVERT INLET
WITH F.E.S. LT.
AND 24" X 58' R.C. PIPE CULVERT OUTLET
WITH HDWL. RT.
REMOVE

MOUNTAIN VIEW RD.

C.L. RAMP 4 CURVE 1
P.I. = 401+24.53
DELTA = 7°27'41" LT.
DOC = 3°00'00"
T = 124.53'
L = 248.71'
P.C. = 400+00.00
P.T. = 402+48.71
Ls = 300.00'
e = -0.057 '/'

CONCRETE BARRIER WALL

STA.	STA.	LT. SIDE TYPE
337+00.00	337+35.34	A
400+00.00	405+15.00	A

C.L. RAMP 4 CURVE 2
P.I. = 405+93.21
DELTA = 1°46'56" RT.
DOC = 3°00'00"
T = 29.71'
L = 59.41'
P.C. = 405+63.50
P.T. = 406+22.91
Ls = N/A
e = N/A

INSTALLATION OF GUARDRAIL

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
405+14.35	407+33.10	LT. OF RAMP 4 =	150	1 EACH	1 EACH

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

300' TAPER
+02.71 -159.03
EXIST. R/W
+13.65
+40.30 -184.08
700' ACCELERATION LANE
+35.55 -184.08
+35.55 -159.03
C.L. I-30 MEDIAN STA. 337+35.34, 53.50' LT. =
C.L. RAMP 4 STA. 400+00.00
+83.99 -184.16
+83.99 -194.16
EXIST. R/W
STA. 406+00.00
END RECONSTRUCTION
MATCH EXISTING PAVEMENT
+71.55
PROPOSED GUARDRAIL
INSPECTION STATION B
FRONTAGE ROAD B
CONST. LIMIT
C.L. RAMP 4
CONC. BARR. WALL (SIDE TY. A)
RAMP 4
P.C. 400+00.00
P.I. 401+24.53
P.T. 402+48.71
P.C. 405+63.50
P.I. 405+93.21
P.T. 406+22.91
-0.020 '/' 335+10.34
-0.057 '/' 400+75.00
-0.057 '/' 401+73.71
-0.020 '/' 404+73.71
-0.020 '/' 405+00.00
+80.00
405+15
N73°5'14"E
N71°18'17"E
20' TRANS.
2' R
4'
6'
15'
18'
10'
400
+00
C.L. I-30 MEDIAN
NOSE +13.65 51.00' LT.
CONC. BARR. WALL (MEDIAN TY. A)
N73°5'27"E
330
335
340
345
26'
12'
36'
48'
CONC. BARR. WALL (SIDE TY. A)
N86°17'23"E
N81°4'15"E
100
RAMP 1
P.C. 100+00.00
-0.020 '/' 98+50.00
-0.040 '/' 100+50.00
P.I. 101+46.99
P.I. 335+56.36 -I-30 MEDIAN
-0.040 '/' 102+56.22
P.T. 102+93.72
NOSE +04.47 65.00' RT.
C.L. RAMP 1
+13.68
20' TRANS.
105
110
111
CONST. LIMIT
N86°56'42"E
N73°9'33"E
INSPECTION STATION A
EXIST. R/W
C.L. I-30 MEDIAN STA. 332+74.41, 53.50' RT. = +65.00 140.94
C.L. RAMP 1 STA. 100+00.00 +65.00 165.00
T.C.E.
+95.00 140.94
+95.00 165.00
+14.75 140.92
+14.75 146.29
650' DECELERATION LANE
+63.74 185.21
+59.90 208.23
P.C. 104+52.56 RAMP 1
+0.025 '/' 104+67.57
P.I. 106+83.44 RAMP 1
P.T. 109+12.09 RAMP 1
STA. 105+85.00
END RECONSTRUCTION
MATCH EXISTING PAVEMENT
FRONTAGE ROAD A
EXIST. R/W
+88.04 270.52
+51 304
MOUNTAIN VIEW CUTOFF

STA. 332+78 - CONSTRUCT
DROP INLET 84' LT. OF C.L. H = 3'-0"
WITH 24" X 59' R.C. PIPE CULVERT INLET
(CLASS IV) (TYPE 3 BEDDING) WITH F.E.S. ON LT.
& 24" X 164' R.C. PIPE CULVERT OUTLET
(CLASS III) (TYPE 3 BEDDING) TO
DROP INLET 78' RT. OF C.L. H = 5'-2"
WITH 24" X 50' R.C. PIPE CULVERT OUTLET
(CLASS III) (TYPE 3 BEDDING) WITH F.E.S. ON RT.
TYPE RM DROP INLET = 4'-0" X 3'-0" = 2 EACH
24" F.E.S. = 2 EACH
Q50 = 18.6 CFS D.A. = 6.2 ACRES

C.L. RAMP 1 CURVE 1
P.I. = 101+46.99
DELTA = 5°52'28" RT.
DOC = 2°00'00"
T = 146.99'
L = 293.72'
P.C. = 100+00.00
P.T. = 102+93.72
Ls = 200.00'
e = -0.040 '/'

STA. 315+00 TO STA. 345+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

C.L. RAMP 1 CURVE 2
P.I. = 106+83.44
DELTA = 13°47'09" LT.
DOC = 3°00'00"
T = 230.88'
L = 459.53'
P.C. = 104+52.56
P.T. = 109+12.09
Ls = 150.00'
e = +0.025 '/'

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
332+78	332+78	15'	RT.	10'	16.67

CONCRETE BARRIER WALL

STA.	STA.	RT. SIDE TYPE
323+50.00	332+74.41	A
100+00.00	104+00.00	A

PLAN MAIN LANES
STA. 330+00 TO STA. 345+00

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PRELIMINARY

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FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	8	23

(2) PLAN STA. 345+00 TO STA. 360+00

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
204+01.49	206+20.24	RT. OF RAMP 2 =	150	1 EACH	1 EACH

STA. 345+00 TO STA. 360+60 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

DODSON CREEK

STA. 345+73 - CONSTRUCT
DROP INLET 82' LT. OF C.L. H = 6'-0"
WITH 36" X 96' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO EXISTING R.C. BOX CULVERT
AT STA. 346+77
TYPE RM DROP INLET = 3'-0" X 4'-0"

STA. 347+76 - CONSTRUCT
DROP INLET 83' LT. OF C.L. H = 6'-0"
WITH 36" X 92' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO EXISTING R.C. BOX CULVERT
AT STA. 346+77
TYPE RM DROP INLET = 3'-0" X 4'-0"

+12.80
-288.81

EXIST. R/W

+16.04
-269.07

+88.30
-299.94

+65.70
-299.91

+88.29
-289.94

EXIST. R/W

FRONTAGE ROAD B

INSPECTION STATION B

C.L. RAMP 4

N73°5'14"E

410

CONST. LIMIT

P.T. 348+70.38
I-30 MEDIAN

300

CONST. LIMIT

C.L. RAMP 3

10'
36'
12'
12'
36'
10'

345
350
355
360

C.L. I-30 MEDIAN

N73°5'27"E

CONC. BARR. WALL
(MEDIAN TY. A)

2' R

C.L. RAMP 2

NOSE
+67.06
51.00' RT.

N73°5'27"E

208

CONC. BARR. WALL
(SIDE TY. A)

48"

6'

CONST. LIMIT

CONST. LIMIT

200

N73°9'33"E

4'

15'

205

N68°14'22"E

+50

65' TRANS.

6'

RAMP 2

INSPECTION STATION A

P.C. 201+76.90
RAMP 2

P.I. 202+58.95
RAMP 2

P.T. 203+40.89
RAMP 2

-0.020 '/'
204+13.28

PROPOSED
GUARDRAIL

P.C. 206+38.28
RAMP 2

-0.057 '/'
207+13.28

-0.057 '/'
207+25.00

P.T. 208+00.00
RAMP 2

-0.020 '/'
359+53.85

+34.96
146.08

+84.66
146.09

+84.67
141.09

C.L. I-30 MEDIAN STA. 357+28.85, 53.50' RT. =
C.L. RAMP 2 STA. 208+00.00

+42.45
168.99

STA. 203+45.00
MATCH EXISTING PAVEMENT
BEGIN RECONSTRUCTION

1015' ACCELERATION LANE

FRONTAGE ROAD A

+47.09
215.66

+53.34
255.17

EXIST. R/W

+22.38
275.87

+50.45
264.76

+51.52
304.75

+15.16
301.33

C.L. RAMP 2 CURVE 1
P.I. = 202+58.95
DELTA = 4°55'11" LT.
DOC = 3°00'00"
T = 82.05'
L = 163.99'
P.C. = 201+76.90
P.T. = 203+40.89
Ls = N/A
e = N/A

C.L. RAMP 2 CURVE 2
P.I. = 207+19.19
DELTA = 4°51'06" RT.
DOC = 3°00'00"
T = 80.91'
L = 161.72'
P.C. = 206+38.28
P.T. = 208+00.00
Ls = 300.00'
e = -0.057 '/'

C.L. I-30 MEDIAN CURVE 3
P.I. = 335+56.36
DELTA = 13°11'56" LT.
DOC = 0°30'00"
T = 1325.76'
L = 2639.78'
P.C. = 322+30.60
P.T. = 348+70.38
Ls = N/A
e = N.C.

DODSON CREEK

STA. 346+77 - IN PLACE
10' X 8' X 486' R.C. BOX CULVERT
WITH 31 WINGS LT. & RT.
WITH DROP INLET 180' LT. - RETAIN
AND DROP INLET 85' LT. - REMOVE
AND DROP INLET 8' LT. - REMOVE
AND DROP INLET 63' RT. - REMOVE
AND DROP INLET 197' RT. - RETAIN
RETAIN
Q50 = 1080.5 CFS D.A. = 284.2 ACRES

STA. 346+73 - CONSTRUCT
DROP INLET 71' RT. OF C.L. H = 7'-6"
ON EXISTING R.C. BOX CULVERT
TYPE TM DROP INLET = 2'-6½" X 3'-0"

STA. 346+73 - CONSTRUCT
DROP INLET 86' LT. OF C.L. H = 2'-10"
ON EXISTING R.C. BOX CULVERT
TYPE TM DROP INLET = 2'-6½" X 4'-0"

STA. 345+74 - CONSTRUCT
DROP INLET 71' RT. OF C.L. H = 5'-0"
WITH 36" X 98' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 346+74 RT.
TYPE RM DROP INLET = 3'-0" X 4'0"

STA. 347+74 - CONSTRUCT
DROP INLET 71' RT. OF C.L. H = 5'-0"
WITH 36" X 98' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 346+74 RT.
TYPE RM DROP INLET = 3'-0" X 4'-0"

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
205+60	207+80	220'	RT.	4' (TYP.)	107.44

B-101

PLAN MAIN LANES
STA. 345+00 TO STA. 360+00

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PRELIMINARY
PRELIMINARY FOR REVIEW ONLY
SHAHRIAR AZAD, P.E., 12404
AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	9	23

(2) **PLAN STA. 360+00 TO STA. 375+00**

STA. 364+84 - IN PLACE
DROP INLET 104' LT. OF C.L. H = 3'-3"
WITH 30" X 49' R.C. PIPE CULVERT INLET
WITH HDWL. LT.
AND 30" X 28' R.C. PIPE CULVERT OUTLET TO
DROP INLET 73' LT. OF C.L. H = 6'-0"
WITH 30" X 85' R.C. PIPE CULVERT OUTLET TO
DROP INLET 80' RT. OF C.L. H = 3'-6"
WITH 30" 56' R.C. PIPE CULVERT OUTLET
ON A 30° RT. FWD. SKEW
WITH HDWL. RT.
REMOVE

STA. 363+93 - CONSTRUCT
DROP INLET 73' LT. OF C.L. H = 6'-0"
WITH 36" X 97' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 364+94 LT.
TYPE RM DROP INLET = 4'-0" X 3'-0"

INSTALLATION OF GUARDRAIL			GUARDRAIL (TY. A)	GUARDRAIL TERMINAL	THRIE BEAM GUARDRAIL TERMINAL
STA.	STA.	LOCATION	LIN. FT.	(TY. 2)	TERMINAL
367+49.40	369+68.15	LT. OF RAMP 3 =	150	1 EACH	1 EACH

C.L. RAMP 3 CURVE 1
P.I. = 303+05.50
DELTA = 5°33'51" RT.
DOC = 3°00'00"
T = 92.81'
L = 185.48'
P.C. = 302+12.69
P.T. = 303+98.17
Ls = 250.00'
e = +0.025 '/'

STA. 364+94 - CONSTRUCT
DROP INLET 105' LT. OF C.L. H = 6'-0"
WITH 48" X 48' R.C. PIPE CULVERT INLET
(CLASS IV) (TYPE 3 BEDDING)
WITH F.E.S. LT.
AND 48" X 34' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING) TO
DROP INLET 68' LT. OF C.L. H = 6'-0"
WITH 48" X 145' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING) TO
DROP INLET 80' RT. OF C.L. H = 5'-0"
WITH 48" X 57' R.C. PIPE CULVERT OUTLET
(CLASS IV) (TYPE 3 BEDDING)
ON A 30° RT. FWD. SKEW WITH F.E.S. RT.
TYPE RM DROP INLET = 5'-0" X 3'-0"
TYPE RM DROP INLET = 5'-0" X 4'-0"
TYPE RM DROP INLET = 6'-0" X 3'-0"
48" F.E.S. = 2 EACH
Q50 = 97.3 CFS D.A. = 17.0 ACRES

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

C.L. RAMP 3 CURVE 2
P.I. = 309+07.40
DELTA = 5°33'38" LT.
DOC = 3°00'00"
T = 92.75'
L = 185.35'
P.C. = 308+14.65
P.T. = 310+00.00
Ls = 300.00'
e = -0.057 '/'

CONC. BARR. WALL - LT. OF RAMP 3		
STA.	STA.	SIDE TYPE
365+50	367+50	A

TRIBUTARY TO SALINE RIVER

STA. 372+56 - IN PLACE
48" X 301' R.C. PIPE CULVERT
WITH HDWLS. LT. & RT.
REMOVE

STA. 372+22 - IN PLACE
DROP INLET 94' LT. OF C.L. H = 6'-8"
WITH 48" X 56' R.C. PIPE CULVERT INLET
ON A 20° RT. FWD. SKEW WITH HDWL. LT.
AND 48" X 89' R.C. PIPE CULVERT OUTLET TO
STA. 372+53 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 15'-10"
WITH 48" X 93' R.C. PIPE CULVERT OUTLET TO
STA. 372+84.14 - IN PLACE
DROP INLET 82' RT. OF C.L. H = 7'-0"
WITH 48" X 53' R.C. PIPE CULVERT OUTLET
ON A 20° RT. FWD. SKEW
WITH DISLOCATED HDWL. RT.
REMOVE

CONC. BARR. WALL - RT. OF EB I-30		
STA.	STA.	SIDE TYPE
355+50	361+50	A
361+50	367+50	E
367+50	369+70	A
369+70	374+60	E
374+60	377+58.75	A

STA. 360+00 TO STA. 375+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

CONCRETE DITCH PAVING (TYPE B)					
STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
365+50	368+05	255'	LT.	4'	113.33
361+70	361+70	15'	RT.	7'	11.67
362+20	362+20	15'	RT.	7'	11.67
362+70	362+70	15'	RT.	7'	11.67
363+20	363+20	15'	RT.	7'	11.67
363+70	363+70	15'	RT.	7'	11.67
364+20	364+20	15'	RT.	7'	11.67
364+70	364+70	15'	RT.	7'	11.67
365+20	365+20	15'	RT.	7'	11.67
365+70	365+70	15'	RT.	7'	11.67
366+20	366+20	15'	RT.	7'	11.67
366+70	366+70	15'	RT.	7'	11.67
367+20	367+20	15'	RT.	7'	11.67
370+20	370+20	15'	RT.	7'	11.67
370+70	370+70	15'	RT.	7'	11.67
371+20	371+20	15'	RT.	7'	11.67
371+70	371+70	15'	RT.	7'	11.67
372+20	372+20	15'	RT.	7'	11.67
372+70	372+70	15'	RT.	7'	11.67
373+20	373+20	15'	RT.	7'	11.67
373+70	373+70	15'	RT.	7'	11.67
374+20	374+20	15'	RT.	7'	11.67

STA. 372+32 - CONSTRUCT
DROP INLET 105' LT. OF C.L. H = 3'-11"
ON R.C. BOX CULVERT AT STA. 372+70
TYPE TM DROP INLET = 2'-6½" X 3'-0"

STA. 372+70 - CONSTRUCT
5' X 5' X 317'-7" R.C. BOX CULVERT
ON A 20°00'00" RT. FWD. SKEW
AND 3:1 WINGS LT. & RT.
(SPAN = 5.32')
Q50 = 264.7 CFS D.A. = 45.5 ACRES

STA. 370+00 - CONSTRUCT
DROP INLET 83' RT. OF C.L. H = 3'-7"
ON R.C. BOX CULVERT AT STA. 372+70
TYPE TM DROP INLET = 2'-6½" X 3'-0"

PLAN MAIN LANES
STA. 360+00 TO STA. 375+00

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	10	23

② PLAN STA. 375+00 TO STA. 390+00

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STA. 375+00 TO STA. 390+00 - IN PLACE
1500 LIN. FT. WRSF
REMOVE

C.L. RAMP 5 CURVE 1
P.I. = 501+17.52
DELTA = 7°02'32" LT.
DOC = 3°00'00"
T = 117.52'
L = 234.74'
P.C. = 500+00.00
P.T. = 502+34.74
Ls = 300.00'
e = -0.057 '/'

C.L. FRONTAGE ROAD B CURVE 1
P.I. = 55+78.44
DELTA = 7°20'14" LT.
DOC = 3°00'00"
T = 122.45'
L = 244.57'
P.C. = 54+55.99
P.T. = 57+00.56
Ls = 200.00'
e = 0.040 '/'

C.L. I-30 MEDIAN CURVE 4
P.I. = 396+53.01
DELTA = 30°17'33" LT.
DOC = 1°00'00"
T = 1550.93'
L = 3029.26'
P.C. = 381+02.09
P.T. = 411+31.35
Ls(1) = 700.00'
Ls(2) = 900.00'
e = 0.037 '/'

C.L. FRONTAGE ROAD B CURVE 2
P.I. = 65+26.77
DELTA = 48°49'56" LT.
DOC = 10°00'00"
T = 260.10'
L = 488.32'
P.C. = 62+66.67
P.T. = 67+54.99
Ls = 250.00'
e = 0.094 '/'

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

1427' AUXILIARY LANE

C.L. I-30 MEDIAN STA. 378+57.46, 53.50' LT. =
C.L. RAMP 5 STA. 500+00.00

STA. 52+75.00
BEGIN RECONSTRUCTION
MATCH EXISTING PAVEMENT

EXIST. R/W

PROP. R/W

CONST. LIMIT

FRONTAGE ROAD B

C.L. FRONTAGE ROAD B

RAMP 5

C.L. RAMP 5

300' TAPER

1300' ACCELERATION LANE

N73°23'9"E

N66°2'56"E

N73°5'27"E

N76°5'27"E

N72°54'14"E

N67°46'43"E

N67°46'41"E

N17°30'E

75' TRANS.

150' TRANSITION

200' TAPER

200' TRANSITION

MATCH ML 376+32.46

CONC. BARR. WALL (MEDIAN TY. A)

CONC. BARR. WALL (MEDIAN TY. B)

CONC. BARR. WALL (MEDIAN TY. C)

CONC. BARR. WALL (SIDE TY. A)

CONC. BARR. WALL (SIDE TY. D)

CONC. BARR. WALL (SIDE TY. E)

CONC. BARR. WALL (MEDIAN TY. B)

PROPOSED GUARDRAIL

C.L. I-30 MEDIAN

C.L. RAMP 1

NOSE +22.97 51.32' LT.

NOSE +51.27 63.00' RT.

CRASH ATTENUATOR

RETAINING WALL 'AA'

EXIST. R/W

C.L. FRONTAGE ROAD A

FRONTAGE ROAD A

RAMP 1

C.L. I-30 MEDIAN STA. 377+58.75, 41.50' RT. =
C.L. RAMP 1 STA. 100+00.00

STA. 377+60 - CONSTRUCT
OVERHEAD SIGN STRUCTURE
NO. OH-030-XX-STA377+60EB

STA. 31+60.00
BEGIN WIDENING & OVERLAY
MATCH EXISTING PAVEMENT
BEGIN CONC. BARR. WALL
(SIDE TY. A)

CONC. BARR. WALL - RT. OF EB I-30		
STA.	STA.	SIDE TYPE
374+60	377+58.75	A

CONC. BARR. WALL - RT. OF RAMP 2		
STA.	STA.	SIDE TYPE
100+00	101+32.07	A
101+32.07	103+12.20	D
103+12.20	114+40	A

CONC. BARR. WALL - I-30 MEDIAN		
STA.	STA.	MEDIAN TYPE
277+23.77	375+77.09	A
375+77.09	390+20.00	B

STA. 377+75 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 18" X 27I' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 380+49 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 380+49 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 18" X 297' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 383+49 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 383+49 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 5'-0"
WITH 24" X 297' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 386+49 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

C.L. RAMP 1 CURVE 1
P.I. = 100+75.02
DELTA = 3°00'00" RT.
DOC = 2°00'00"
T = 75.02'
L = 150.00'
P.C. = 100+00.00
P.T. = 101+50.00
Ls = N/A
e = N/A

STA. 386+49 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 5'-0"
WITH 24" X 60' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 108+97 LT.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 108+97 C.L. RAMP 1- CONSTRUCT
DROP INLET 9' LT. OF C.L. H = 8'-0"
WITH 24" X 80' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 109+79 LT.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 109+79 C.L. RAMP 1- CONSTRUCT
DROP INLET 10' LT. OF C.L. H = 6'-0"
WITH 36" X 48' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 110+24 RT.
TYPE ST DROP INLET = 3'-0" X 4'-3"

STA. 110+24 C.L. RAMP 1- CONSTRUCT
DROP INLET 13' RT. OF C.L. H = 6'-0"
WITH 36" X 147' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 111+74 RT.
TYPE ST DROP INLET = 3'-0" X 4'-3"

STA. 111+74 C.L. RAMP 1- CONSTRUCT
DROP INLET 13' RT. OF C.L. H = 6'-0"
WITH 36" X 147' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 113+24 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 113+24 C.L. RAMP 1- CONSTRUCT
DROP INLET 21' RT. OF C.L. H = 6'-0"
WITH 36" X 56' R.C. PIPE CULVERT OUTLET
WITH F.E.S. RT.
(CLASS IV) (TYPE 3 BEDDING)
TYPE ST DROP INLET = 3'-0" X 4'-3"

C.L. FRONTAGE ROAD A CURVE 1
P.I. = 34+86.62
DELTA = 5°07'33" LT.
DOC = 1°30'00"
T = 170.98'
L = 341.72'
P.C. = 33+15.64
P.T. = 36+57.36
Ls = 200.00'
e = 0.021'/'

C.L. RAMP 1 CURVE 2
P.I. = 106+56.35
DELTA = 8°18'45" LT.
DOC = 1°45'00"
T = 237.91'
L = 474.99'
P.C. = 104+18.43
P.T. = 108+93.42
Ls = 300.00'
e = +0.037 '/'

STA. 387+78 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 10'-10"
WITH 24" X 163' R.C. PIPE INLET
ON A 10° LT. FWD. SKEW WITH HDWL. RT.
AND 24" X 166' R.C. PIPE OUTLET
ON A 10° LT. FWD. SKEW WITH HDWL. LT.
REMOVE

STA. 389+05 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 18" X 297' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 392+05 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

C.L. FRONTAGE ROAD A CURVE 2
P.I. = 40+96.86
DELTA = 72°12'30" RT.
DOC = 19°00'00"
T = 219.93'
L = 380.04'
P.C. = 38+76.93
P.T. = 42+56.97
Ls = 250.00'
e = 0.095 '/'

PLAN MAIN LANES
STA. 375+00 TO STA. 390+00

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				6	ARK.			
				JOB NO.		CA0601	II	23

PLAN STA. 390+00 TO STA. 405+00

CONC. BARR. WALL - LT. OF WB I-30		
STA.	STA.	SIDE TYPE
390+00	396+36.46	A
402+71.65	403+60	A

CONC. BARR. WALL - I-30 MEDIAN		
STA.	STA.	MEDIAN TYPE
375+77.09	390+20	B
390+20	395+15.77	C
395+15.77	395+65.77	C-I
398+12.54	398+62.54	C-I
398+62.54	410+71.76	C

CONC. BARR. WALL - RT. OF EB I-30		
STA.	STA.	SIDE TYPE
386+33.32	386+80	A
386+80	392+80	E
392+80	395+29.31	A
397+49.43	400+50	A

INSTALLATION OF GUARDRAIL			GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
STA.	STA.	LOCATION			
403+60	405+28.75	LT. OF RAMP 1 =	100	1 EACH	1 EACH
202+16.25	204+10	RT. OF RAMP 4 =	125	1 EACH	1 EACH

C.L. I-30 MEDIAN CURVE 4
P.I. = 396+53.01
DELTA = 30°17'33" LT.
DOC = 1°00'00"
T = 1550.93'
L = 3029.26'
P.C. = 381+02.09
P.T. = 411+31.35
Ls(1) = 700.00'
Ls(2) = 900.00'
e = 0.037 '/'

C.L. RAMP 4 CURVE 4
P.I. = 411+59.11
DELTA = 24°39'39" LT.
DOC = 24°45'00"
T = 50.60'
L = 99.64'
P.C.C. = 411+08.51
P.T. = 412+08.15
Ls = N/A
e = N/A

C.L. RAMP 4 CURVE 1
P.I. = 401+50.51
DELTA = 6°00'54" LT.
DOC = 2°00'00"
T = 150.51'
L = 300.75'
P.C. = 400+00.00
P.T. = 403+00.75
Ls = N/A
e = -0.037 '/'

C.L. RAMP 5 CURVE 2
P.I. = 512+97.14
DELTA = 11°31'26" LT.
DOC = 1°15'00"
T = 462.51'
L = 921.90'
E = 23.28'
P.C. = 508+34.63
P.C.C. = 517+56.54
Ls = 300.00'
e = -0.026 '/'

C.L. RAMP 5 CURVE 3
P.I. = 518+81.81
DELTA = 47°14'09" LT.
DOC = 20°00'00"
T = 125.27'
L = 236.19'
P.C.C. = 517+56.54
P.T. = 519+92.72
Ls = 300.00'
e = -0.060 '/'

C.L. RAMP 4 CURVE 3
P.I. = 410+75.56
DELTA = 125°47'50" LT.
DOC = 42°00'00"
T = 266.57'
L = 299.52'
P.C.C. = 408+08.99
P.C.C. = 411+08.51
Ls = 200.00'
e = -0.100 '/'

C.L. RAMP 4 CURVE 2
P.I. = 406+84.10
DELTA = 74°24'18" LT.
DOC = 24°45'00"
T = 175.73'
L = 300.63'
P.C. = 405+08.37
P.C.C. = 408+08.99
Ls = 300.00'
e = -0.100 '/'

C.L. RAMP 2 CURVE 1
P.I. = 201+57.64
DELTA = 22°41'53" LT.
DOC = 9°00'00"
T = 127.78'
L = 252.20'
P.C. = 200+29.87
P.T. = 202+82.07
Ls = N/A
e = N/A

STA. 399+85 - IN PLACE
DBL. 10' X 6' X 462' R.C. BOX CULVERT
ON A 29°50' RT. FWD. SKEW
(SPAN = 22.50')
WITH 3:1 WINGS LT. & RT.
AND DRAINAGE OPENING 118' LT. - REMOVE
RETAIN & REMOVE WINGS LT. & RT.
AND EXTEND R.C. BOX 30'-6" LT. AND 48'-7" RT.
TO A COMPLETED LENGTH OF 542'-4¼"
STA. 399+62 - CONSTRUCT
10' X 6' X 548'-3" R.C. BOX CULVERT
ON A 34°17' RT. FWD. SKEW
WITH 3:1 WINGS LT. & RT.
(SPAN = 35.12')
050 = 1819.6 CFS D.A. = 458.9 ACRES

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

PLAN MAIN LANES
STA. 390+00 TO STA. 405+00

B-104

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AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	12	23

② PLAN STA. 405+00 TO STA. 420+00

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

INSTALLATION OF GUARDRAIL			GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
STA.	STA.	LOCATION			
408+71.11	410+89.86	RT. OF EB I-30 =	150	1 EACH	1 EACH

C.L. RAMP 3 CURVE 1
P.I. = 306+46.75
DELTA = 54°29'26" LT.
DOC = 10°00'00"
T = 295.03'
L = 544.91'
P.C. = 303+51.71
P.T. = 308+96.62
Ls(1) = 450.00'
Ls(2) = 300.00'
e = -0.094 '/'

CONC. BARR. WALL - LT. OF WB I-30		
STA.	STA.	SIDE TYPE
407+00.00	411+85.07	A
417+70.63	418+23.04	A

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

REMOVAL AND DISPOSAL OF GUARDRAIL			
STA.	STA.	LOCATION	UNIT
408+35	411+54	LT. OF EB I-30	319 LIN. FT.
408+44	411+13	RT. OF EB I-30	269 LIN. FT.
417+04	420+23	RT. OF WB I-30	319 LIN. FT.
417+44	420+13	LT. OF WB I-30	269 LIN. FT.

STA. 305+30 - CONSTRUCT
42" X 120' R.C. PIPE CULVERT
ON A 20° LT. FWD. SKEW
(CLASS III) (TYPE 3 BEDDING)
WITH F.E.S. LT. & RT.

STA. 405+00 TO STA. 409+62 - IN PLACE
462 LIN. FT. WRSF
REMOVE

STA. 411+50 - CONSTRUCT
OVERHEAD SIGN STRUCTURE
NO. OH-030-XX-STA411+50WB

C.L. RAMP 3 CURVE 2
P.I. = 319+40.23
DELTA = 4°00'00" RT.
DOC = 1°00'00"
T = 200.08'
L = 400.00'
P.C. = 317+40.15
P.T. = 321+40.15
Ls = N/A
e = N/A

SALINE RIVER RELIEF

RAMP 3
RAMP 2
BRIDGE XXXXX
BRIDGE XXXXX
BRIDGE XXXXX
C.L. RAMP 3
C.L. RAMP 2
C.L. I-30 MEDIAN
EXIST. R/W
CONST. LIMIT
PROP. R/W & C/A
100 YR. FLOODPLAIN LIMIT
400' TAPER
200' TAPER
300' TAPER
1205' AUXILIARY LANE
CONC. BARR. WALL (MEDIAN TY. C)
CONC. BARR. WALL (MEDIAN TY. C-1)
CONC. BARR. WALL (MEDIAN TY. B-1)
CONC. BARR. WALL (SIDE TY. A)
CONC. BARR. WALL (MEDIAN TY. A)
CONC. BARR. WALL (SIDE TY. A)
NOSE +23.14 51.62' RT.
NOSE +44.83 65.67' LT.
50' TRANS.
C.D.P.
PROPOSED GUARDRAIL
P.T. 411+31.35 I-30 MEDIAN
P.C. 303+51.71 RAMP 3
P.I. 306+46.75 RAMP 3
P.I. 308+96.62 RAMP 3
P.C. 317+40.15 RAMP 3
P.I. 319+40.23 RAMP 3
N42°47'54"E
N45°4'50"E
S82°42'40"E
+90.00 -218.33
+70.00
+50.00
+00.00
+85.07
+70.63
+23.04
+44.83
+01.27
+28.38
-0.094 '/' 304+45.46
-0.037 '/' 212+47.83
-0.037 '/' 409+06.35
-0.020 '/' 209+97.83
-0.020 '/' 311+21.62
-0.020 '/' 418+06.35

STA. 305+51 - IN PLACE
18" X 79' R.C. PIPE CULVERT
WITH HDWLS, LT. & RT.
REMOVE

STA. 409+77 - IN PLACE
MODIFIED STACK PIPE INLET IN MEDIAN
WITH 18" X 118' R.C. PIPE OUTLET ON RT.
WITH HDWL.
REMOVE

STA. 418+90 TO STA. 420+00 - IN PLACE
110 LIN. FT. WRSF
REMOVE

C.L. I-30 MEDIAN CURVE 4
P.I. = 396+53.01
DELTA = 30°17'33" LT.
DOC = 1°00'00"
T = 1550.93'
L = 3029.26'
P.C. = 381+02.09
P.T. = 411+31.35
Ls(1) = 700.00'
Ls(2) = 900.00'
e = 0.037 '/'

CONC. BARR. WALL - I-30 MEDIAN		
STA.	STA.	MEDIAN TYPE
398+62.72	410+71.76	B
410+71.76	411+21.76	B-1
417+25.12	417+75.12	B-1
417+75.12	433+06.64	A

STA. 408+51 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 24" x 90' R.C. PIPE OUTLET ON RT.
(CLASS IV) (TYPE 3 BEDDING) WITH F.E.S.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 410+72 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 18" X 128' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 409+41 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 406+22 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 24" X 136' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 407+61 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 407+61 - CONSTRUCT
DROP INLET 3' RT. OF C.L. H = 5'-0"
WITH 24" X 87' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 408+51 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 409+41 - CONSTRUCT
DROP INLET 3' RT OF C.L. H = 5'-0"
WITH 18" X 87' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 408+51 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

CONCRETE DITCH PAVING (TYPE B)					
STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
408+51	408+51	30'	RT.	8'-0"	26.67

PLAN MAIN LANES
STA. 405+00 TO STA. 420+00

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	13	23

② PLAN STA. 420+00 TO STA. 432+00

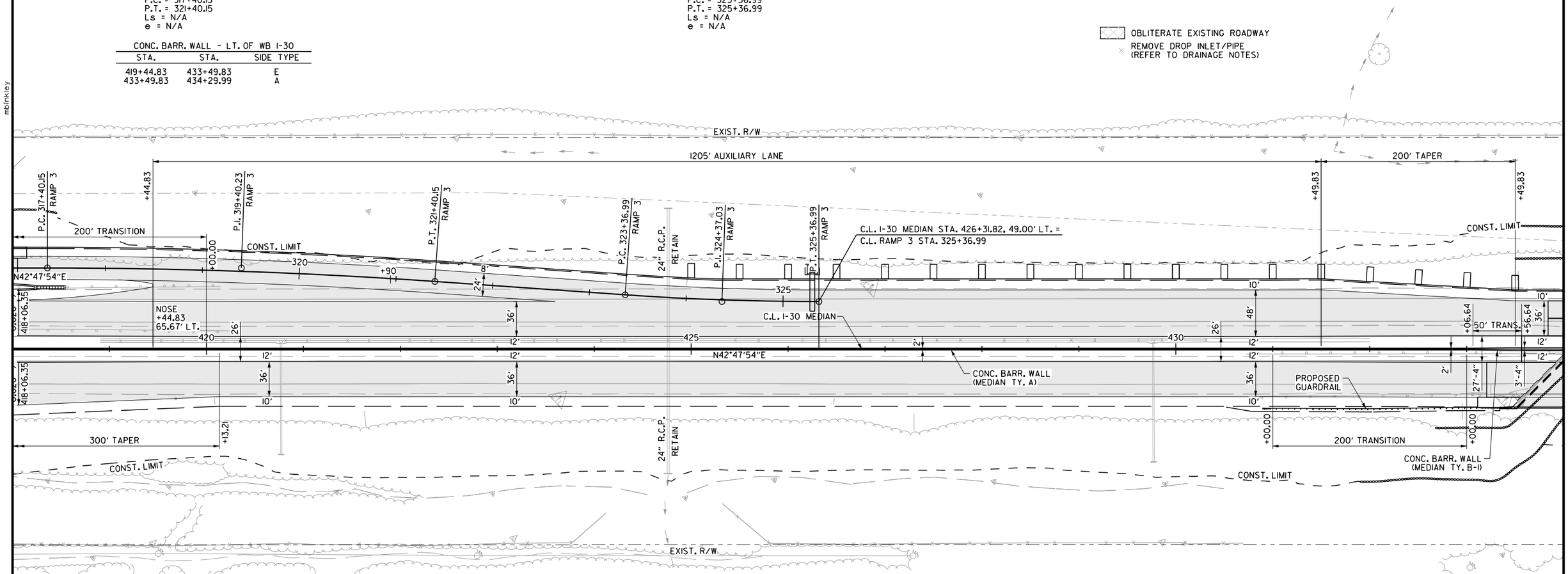
C.L. RAMP 3 CURVE 2
P.I. = 319+40.23
DELTA = 4°00'00" RT.
DOC = 1°00'00"
T = 200.08'
L = 400.00'
P.C. = 317+40.15
P.T. = 321+40.15
Ls = N/A
e = N/A

C.L. RAMP 3 CURVE 3
P.I. = 324+37.03
DELTA = 4°00'00" LT.
DOC = 2°00'00"
T = 100.04'
L = 200.00'
P.C. = 323+36.99
P.T. = 325+36.99
Ls = N/A
e = N/A

CONC. BARR. WALL - LT. OF WB I-30		
STA.	STA.	SIDE TYPE
419+44.83	433+49.83	E
433+49.83	434+29.99	A

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)



STA. 420+77 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 12'-3"
WITH 18" X 115' R.C. PIPE CULVERT OUTLET
WITH HDWL. ON RT.
REMOVE

STA. 424+76 - IN PLACE
24" X 274' R.C. PIPE CULVERT
WITH HDWLS. LT. & RT.
RETAIN

CONCRETE BARRIER WALL		
STA.	STA.	MEDIAN TYPE
417+75.12	433+06.64	A
433+06.64	433+56.64	B-1

STA. 429+77 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 15'-3"
WITH 18" X 123' R.C. PIPE CULVERT OUTLET
WITH HDWL. ON RT.
REMOVE

STA. 420+00 TO STA. 432+00 - IN PLACE
1200 LIN. FT. WRSF
REMOVE

REMOVAL AND DISPOSAL OF GUARDRAIL			
STA.	STA.	LOCATION	UNIT
430+82	433+51	RT. OF EB I-30	269 LIN. FT.
430+72	433+91	LT. OF EB I-30	319 LIN. FT.

PLAN MAIN LANES
STA. 420+00 TO STA. 432+00

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DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	14	23

(2) PLAN STA. 432+00 TO STA. 447+00

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OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

SALINE RIVER

EXIST. R/W

MUSSEL BED

HENRY ST.

200' TAPER

CONC. BARR. WALL (MEDIAN TY. A)

PROPOSED GUARDRAIL

BRIDGE XXXXX

10'
+06.64
50' TRANS.
+56.64
36'
12'
12'
435
C.L. I-30 MEDIAN
440
N42°47'54"E
445
+20.07
+70.07
50' TRANS.
36'
CONC. BARR. WALL (MEDIAN TY. A)
2'
3'-4"
27'-4"
3'-4"
2'
36'
10'
CONC. BARR. WALL (SIDE TY. A)
+00.00
PROPOSED GUARDRAIL
200' TRANS.
CONC. BARR. WALL (MEDIAN TY. B-1)
+46.74
CONC. BARR. WALL (MEDIAN TY. B-1)
+75
200' TRANS.
100 YR. FLOODPLAIN LIMIT

BRIDGE XXXXX

HENRY ST.

EXIST. R/W

SALINE RIVER

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
417+75.12	433+06.64	A
433+06.64	433+56.64	B-1
445+20.01	445+70.01	B-1
445+70.01	468+54.23	A

CONC. BARR. WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
444+46.74	458+01.46	A

INSTALLATION OF GUARDRAIL

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
430+91.21	433+34.96	RT. OF EB I-30 =	175	1 EACH	1 EACH
445+41.52	447+85.27	LT. OF WB I-30 =	175	1 EACH	1 EACH

PLAN MAIN LANES
STA. 432+00 TO STA. 447+00

B-107

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AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	15	23

(2) PLAN STA. 447+00 TO STA. 462+00

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OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

EXIST. R/W

EXIST. R/W

PROPOSED GUARDRAIL

CONST. LIMIT

100 YR. FLOODPLAIN LIMIT

CONST. LIMIT

300' TAPER

+85.88

10'

36'

26'

12'

12'

36'

10'

C.L. I-30 MEDIAN

450

455

460

N42°47'54"E

2'

CONC. BARR. WALL
(SIDE TY. A)

CONC. BARR. WALL
MEDIAN TY. A)

100

N42°47'54"E

N46°17'54"E

105

200' TRANSITION

+75

+00

C.L. RAMP I

CONST. LIMIT

CONST. LIMIT

100 YR. FLOODPLAIN LIMIT

C.L. I-30 MEDIAN STA. 457+02.36, 41.50' RT. =
C.L. RAMP I STA. 100+00.00

P.C. 100+00.00
RAMP I

P.I. 100+58.35
RAMP I

P.T. 101+16.67
RAMP I

CONC. BARR. WALL
(SIDE TY. E)

P.C. 105+11.18
RAMP I

HENRY ST.

DBL. 36" R.C.P.

RETAIN

DBL. 30" R.C.P.

RETAIN

EXIST. R/W

EXIST. R/W

STA. 457+00 - CONSTRUCT
OVERHEAD SIGN STRUCTURE
NO. OH-030-XX-STA457+00EB

LAKE SUNSET

CONC. BARR. WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
444+46.74	458+01.46	A

CONC. BARR. WALL - RT. OF RAMP I

STA.	STA.	SIDE TYPE
101+00.00	112+00.00	E

C.L. RAMP I CURVE I
P.I. = 100+58.35
DELTA = 3°30'00" RT.
DOC = 3°00'00"
T = 58.35'
L = 116.67'
P.C. = 100+00.00
P.T. = 101+16.67
Ls = N/A
e = N/A

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
101+50	101+50	15'	RT.	7'	11.67
102+00	102+00	15'	RT.	7'	11.67
102+50	102+50	15'	RT.	7'	11.67
103+00	103+00	15'	RT.	7'	11.67
103+50	103+50	15'	RT.	7'	11.67
104+00	104+00	15'	RT.	7'	11.67
104+50	104+50	15'	RT.	7'	11.67
105+00	105+00	15'	RT.	7'	11.67

STA. 448+77 - IN PLACE
DROP INLET 8' LT. OF C.L. H = 11'-6"
WITH 18" X 100' R.C. PIPE OUTLET
WITH HDWL. RT.
REMOVE

STA. 456+77 - IN PLACE
DROP INLET 9' LT. OF C.L. H = 8'-7"
WITH 18" X 89' R.C. PIPE CULVERT OUTLET
WITH HDWL. RT.
REMOVE

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PLAN MAIN LANES
STA. 447+00 TO STA. 462+00

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AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	16	23

② PLAN STA. 462+00 TO STA. 477+00

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OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

100 YR. FLOODPLAIN LIMIT

STA. 469+98 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 24" X 92' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 469+26 RT.
TYPE ST DROP INLET = 4'-0" X 4'-0"

C.L. RAMP 4 CURVE 1
P.I. = 401+78.56
DELTA = 1°47'08" LT.
DOC = 0°30'00"
T = 178.56'
L = 357.09'
P.C. = 400+00.00
P.T. = 403+57.09
Ls = N/A
e = N.C.

C.L. I-30 MEDIAN CURVE 5
P.I. = 481+89.06
DELTA = 28°18'18" RT.
DOC = 1°25'00"
T = 1019.83'
L = 1998.01'
P.C. = 471+69.23
P.T. = 491+67.24
Ls = 420.00'
e = 0.054 '/'

STA. 470+53 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 24" X 52' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 469+98 LT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 472+02 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 18" X 146' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 470+53 LT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 473+95 - CONSTRUCT
DROP INLET 61' LT. OF C.L. H = X'-0"
WITH 18" X 53' R.C. PIPE OUTLET ON LT.
(CLASS III) (TYPE 3 BEDDING) WITH F.E.S.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 473+52 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 18" X 197' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 472+02 LT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 475+51 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 18" X 147' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 473+52 LT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 477+00 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 5'-0"
WITH 18" X 147' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 475+51 LT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
445+70.07	468+54.23	A
468+54.23	471+20.00	B
471+20.00	496+80.00	C

300' TAPER
750' ACCELERATION LANE
+85.88
C.L. I-30 MEDIAN STA. 467+34.61, 53.50' LT. =
C.L. RAMP 4 STA. 400+00.00
EXIST. R/W
CONST. LIMIT
P.C. 400+00.00 RAMP 4
P.I. 401+78.56 RAMP 4
P.T. 403+57.09 RAMP 4
C.L. RAMP 4
R 2'
N41°0'46"E
RAMP 4
-0.020 '/' 409+75.25
400
405
410
N42°47'54"E
C.L. I-30 MEDIAN
-0.020 '/' 468+54.23
CONC. BARR. WALL (MEDIAN TY. B)
NOSE +35.88 51.00' LT.
-0.054 '/' 472+74.23
CONC. BARR. WALL (MEDIAN TY. C)
465
470
475
+20
NOSE +37.96 63.00' RT.
CRASH ATTENUATOR
CONC. BARR. WALL (SIDE TY. A)
+47.96
CONC. BARR. WALL (MEDIAN TY. A)
105
N46°17'54"E
CONC. BARR. WALL (SIDE TY. E)
-0.020 '/' 106+36.27
CONST. LIMIT
C.L. RAMP 1
110
115
+48.37
+00
CONC. BARR. WALL (SIDE TY. A)
I-30 MEDIAN
-0.020 '/' +01.91
-0.040 '/' +66.91
-0.040 '/' +18.45
85° CURVE
N45°21'54"E
RAMP 1
PROPOSED GUARDRAIL
CONC. BARR. WALL (SIDE TY. A)
R 75'
-0.020 '/' +03.48
-0.040 '/' +68.88
P.C. 105+11.18 RAMP 1
P.I. 106+86.23 RAMP 1
P.T. 108+61.18 RAMP 1
P.C. 111+87.41 RAMP 1
P.I. 113+15.76 RAMP 1
P.T. 114+44.07 RAMP 1
EXIST. R/W
P.C. 117+65.66 RAMP 1
P.I. 118+35.83 RAMP 1
P.T. 118+91.59 RAMP 1
CONST. LIMIT
C.L. FRONTAGE ROAD C
STA. 85+50.00
END RECONSTRUCTION
MATCH EXISTING PAVEMENT
-0.040 '/' +68.88
-0.040 '/' +18.88
N18°19'34"E
85
FRTG. RD. C
EXIST. R/W
P.C. FRTG. RD. C

100 YR. FLOODPLAIN LIMIT

CONC. BARR. WALL - RT. OF RAMP 1

STA.	STA.	SIDE TYPE
101+00.00	112+00.00	E
112+00.00	113+00.00	A

CONC. BARR. WALL - LT. OF RAMP 1

STA.	STA.	SIDE TYPE
107+54.53	113+48.37	A

C.L. RAMP 1 CURVE 2
P.I. = 106+86.23
DELTA = 3°30'00" LT.
DOC = 1°00'00"
T = 175.05'
L = 350.00'
P.C. = 105+11.18
P.T. = 108+61.18
Ls = N/A
e = N.C.

STA. 465+27 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 6'-0"
WITH 36" X 41' R.C. PIPE ON RT.
(CLASS IV) (TYPE 3 BEDDING) WITH F.E.S.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 465+26 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 5'-0"
WITH 30" X 196' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 497+27 RT.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 467+27 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 6'-0"
WITH 36" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 465+27 RT.
TYPE ST DROP INLET = 4'-0" X 3'-0"

C.L. RAMP 1 CURVE 3
P.I. = 113+15.76
DELTA = 2°34'00" RT.
DOC = 1°00'00"
T = 128.35'
L = 256.65'
P.C. = 111+87.41
P.T. = 114+44.07
Ls = N/A
e = N.C.

C.L. RAMP 1 CURVE 4
P.I. = 118+35.83
DELTA = 62°57'41" RT.
DOC = 50°00'00"
T = 70.17'
L = 125.92'
P.C. = 117+65.66
P.T. = 118+91.59
Ls = 85.00'
e = -0.040 '/'

STA. 471+27 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 5'-0"
WITH 24" X 198' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 469+26 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 473+29 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 5'-0"
WITH 18" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 471+27 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 475+32 - CONSTRUCT
DROP INLET 57' RT. OF C.L. H = 5'-0"
WITH 18" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 479+29 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

C.L. FRONTAGE ROAD C STA. 86+92.60 =
C.L. SOUTH ST. RAMP 1 STA. 119+40.16
∠ = 90°0'0"

CONC. BARR. WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
464+56.06	488+50.00	A

INSTALLATION OF GUARDRAIL

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. I)	THRIE BEAM GUARDRAIL TERMINAL
113+48.37	117+92.12	LT. OF RAMP 1 =	425	1 EACH	1 EACH

B-109

PLAN MAIN LANES
STA. 462+00 TO STA. 477+00

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FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	17	23

PLAN STA. 477+00 TO STA. 490+00

W. SOUTH ST. (HWY. 229)

KING RD.

TROUTT

FRONTAGE ROAD D

FRONTAGE ROAD C

FAIRFIELD RD.

RAMP 4

C.L. RAMP 4 CURVE 2
P.I. = 412+44.53
DELTA = 5°33'24" RT.
DOC = 2°00'00"
T = 139.03'
L = 277.84'
P.C. = 411+05.50
P.T. = 413+83.34
Ls = 175.00'
e = +0.028 '/'

C.L. AR 229 CURVE 1
P.I. = 10+95.05
DELTA = 38°44'33" LT.
DOC = 26°00'00"
T = 77.48'
L = 149.01'
P.C. = 10+17.57
P.T. = 11+66.58
Ls = N/A
e = N/A

C.L. I-30 MEDIAN CURVE 5
P.I. = 481+89.06
DELTA = 28°18'18" RT.
DOC = 1°25'00"
T = 1019.83'
L = 1998.01'
P.C. = 471+69.23
P.T. = 491+67.24
Ls = 420.00'
e = 0.054 '/'

C.L. FRONTAGE ROAD D CURVE 1
P.I. = 127+52.07
DELTA = 26°29'17" RT
DOC = 13°30'00"
T = 99.89'
L = 196.21'
P.C. = 126+52.18
P.T. = 128+48.39
Ls = N/A
e = N/A

C.L. FRONTAGE ROAD C CURVE 1
P.I. = 89+12.46
DELTA = 39°19'10" RT.
DOC = 13°00'00"
T = 157.46'
L = 302.46'
P.C. = 87+55.64
P.T. = 90+58.10
Ls = 250.00'
e = 0.100 '/'

C.L. FAIRFIELD RD. CURVE 1
P.I. = 6+87.88
DELTA = 34°36'53" LT.
DOC = 19°00'00"
T = 93.97'
L = 182.18'
P.C. = 5+93.91
P.T. = 7+76.09
Ls = N/A
e = N.C.

C.L. FRONTAGE ROAD C CURVE 2
P.I. = 98+24.69
DELTA = 13°27'29" RT.
DOC = 1°45'00"
T = 386.29'
L = 769.02'
P.C. = 94+38.40
P.T. = 102+07.42
Ls = 200.00'
e = 0.025 '/'

STA. 413+56.20
END RECONSTRUCTION
MATCH EXISTING PAVEMENT

C.L. RAMP 4 STA. 413+80.99 =
C.L. HWY. 229 STA. 10+05.50
∠ = 89°57'11"

C.L. FRONTAGE ROAD C STA. 94+04.36 =
C.L. FAIRFIELD RD. STA. 8+00.00
∠ = 90°26'33"

STA. 88+00.00
BEGIN CURBS (TY. A)

STA. 5+93.91
BEGIN RECONSTRUCTION
MATCH EXISTING PAVEMENT

STA. 89+20.00 IN PLACE
24" x 80' R.C.
PIPE CULVERT
WITH F.E.S.
REMOVE

STA. 89+64.58 CONSTRUCT
APPROACH ON RT. = 10 CU. YDS.

STA. 477+30 - CONSTRUCT
DBL. 36" X 148' R.C. PIPE CULVERT
ON A 20° LT. FWD. SKEW
(CLASS IV) (TYPE 3 BEDDING)
WITH F.E.S. LT. & RT.
36" R.C. PIPE CULVERT = 296 LIN. FT.
36" F.E.S. = 4 EACH
Q50 = 107.0 CFS D.A. = 33.76 ACRES

STA. 94+04.36 CONSTRUCT
APPROACH ON RT. = 50 CU. YDS.

STA. 100+85.93 CONSTRUCT
APPROACH ON RT. = 5 CU. YDS.

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

CONC. BARR. WALL - RT. OF EB I-30

STA.	STA.	SIDE TYPE
464+56.06	488+50.00	A
488+50.00	496+80.00	D

STA. 478+67 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 4'-0"
WITH 18" X 56' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 478+64 RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 478+64 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 42" X 130' R.C. PIPE OUTLET
(CLASS IV) (TYPE 3 BEDDING)
WITH F.E.S. RT.
TYPE ST DROP INLET = 5'-0" X 3'-0"

STA. 480+71 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 4'-0"
WITH 18" X 55' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 480+71 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 42" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 478+64 RT.
TYPE ST DROP INLET = 5'-0" X 3'-0"

STA. 482+78 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 4'-0"
WITH 18" X 55' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 482+78 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 42" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 480+71 RT.
TYPE ST DROP INLET = 5'-0" X 3'-0"

STA. 484+85 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 4'-0"
WITH 18" X 55' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 484+85 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 42" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 482+78 RT.
TYPE ST DROP INLET = 5'-0" X 3'-0"

STA. 486+92 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = 4'-0"
WITH 18" X 56' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 486+92 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 484+85 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 488+95 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = X'-0"
WITH 18" X 56' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 488+95 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 486+92 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

PLAN MAIN LANES
STA. 477+00 TO STA. 490+00

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FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	18	23

② PLAN STA. 490+00 TO STA. 504+00

SEE FRONTAGE ROAD D PLAN & PROFILE FOR ADDITIONAL DRAINAGE INFORMATION

PIKE RD.

BASS LN.

CROUCH ST.

STA. 135+28 C.L. FRTG. RD. D - CONSTRUCT
DROP INLET 30' RT. OF C.L. H = 6'-0"
WITH 42" X 195' R.C. PIPE OUTLET
(CLASS IV) (TYPE 3 BEDDING) WITH F.E.S.
TYPE RM DROP INLET = 4'-0" X 5'-0"

STA. 137+28 C.L. FRTG. RD. D - CONSTRUCT
DROP INLET 26' RT. OF C.L. H = 6'-0"
WITH 42" X 198' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 135+28 RT.
TYPE RM DROP INLET = 4'-0" X 5'-0"

STA. 494+58 C.L. I-30 MEDIAN - CONSTRUCT
DROP INLET 56' LT. OF C.L. H = 7'-0"
WITH 36" X 200' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 137+28 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 500+57 C.L. I-30 MEDIAN - CONSTRUCT
DROP INLET 56' LT. OF C.L. H = 6'-0"
WITH 36" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 498+53 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 498+53 C.L. I-30 MEDIAN - CONSTRUCT
DROP INLET 56' LT. OF C.L. H = 6'-0"
WITH 36" X 198' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 496+52 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 496+52 C.L. I-30 MEDIAN - CONSTRUCT
DROP INLET 56' LT. OF C.L. H = 6'-0"
WITH 36" X 192' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 494+58 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

CONCRETE BARRIER WALL

STA.	STA.	LT. SIDE TYPE
491+70.00	3495+00.00	A
493+09+06.27	3509+06.27	D

C.L. I-30 MEDIAN STA. 3495+00.00
C.L. WB I-30 STA. 3494+00.00

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
471+20.00	496+80.00	C
496+80.00	499+20.00	B
499+20.00	508+81.03	C

C.L. FRTG. RD. D CURVE 2
P.I. = 144+53.10
DELTA = 8°45'20" LT.
DOC = 2°00'00"
T = 219.32'
L = 437.78'
P.C. = 142+33.79
P.C.C. = 46+71.56
Ls = MATCH EXIST.
e = MATCH EXIST.

C.L. FRTG. RD. D CURVE 3
P.I. = 147+44.63
DELTA = 21°39'30" LT.
DOC = 15°00'00"
T = 73.07'
L = 144.39'
P.C.C. = 46+71.56
P.T. = 148+15.95
Ls = N/A
e = N.C.

STA. 502+71 C.L. I-30 MEDIAN - CONSTRUCT
DROP INLET 56' LT. OF C.L. H = 6'-0"
WITH 36" X 207' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 500+57 RT.
TYPE ST DROP INLET = 4'-0" X 4'-0"

STA. 145+23 C.L. FRTG. RD. D - CONSTRUCT
DROP INLET 14' RT. OF C.L. H = 4'-0"
WITH 18" X 5' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 500+57 LT.
TYPE C DROP INLET = 2'-6" X 4'-0"

STA. 144+38.00
BEGIN CURB (TY. A)

STA. 144+50.00
BEGIN CURB (TY. A)

STA. 145+35.00
MATCH EXISTING PAVEMENT
BEGIN RECONSTRUCTION

C.L. FRONTAGE ROAD D

EXIST. R/W

CONST. LIMIT

FRONTAGE ROAD D

PROP. R/W & C/A

N73°3'28"E

N64°18'8"E

N42°38'38"E

C.L. I-30 MEDIAN

CONC. BARR. WALL (SIDE TY. A)

CONC. BARR. WALL (SIDE TY. D)

CONC. BARR. WALL (MEDIAN TY. B)

CONC. BARR. WALL (MEDIAN TY. C)

CONC. BARR. WALL (SIDE TY. D)

CONC. BARR. WALL (SIDE TY. A)

CONC. BARR. WALL (SIDE TY. E)

WB I-30

EB I-30

80' TRANS.

C.L. SOUTH ST.

N51°10'39"W

N51°51'28"E

N51°31'28"E

N70°56'10"E

N52°38'11"E

C.L. FRONTAGE ROAD C

C.L. FRTG. RD. C STA. 102+07.42
C.L. I-30 MEDIAN STA. 494+00.00, 13.00' RT. =
C.L. EB I-30 STA. 2494+00.00

CONCRETE BARRIER WALL

STA.	STA.	RT. SIDE TYPE
488+50.00	496+80.00	D
2496+80.00	2497+60.00	A
2497+60.00	2504+50.00	E

C.L. FRONTAGE ROAD C STA. 109+53.37 =
C.L. AIRLANE DR. STA. 5+00.00
∠ = 110°5'32"

STA. 106+94.61 CONSTRUCT
APPROACH ON RT. = XX CU. YDS.

STA. 4+70.81
C.L. AIRLANE DR.
END RECONSTRUCTION
MATCH EXISTING PAVEMENT

STA. 109+77.55
END RECONSTRUCTION
MATCH EXISTING PAVEMENT

END CURB (TY. A)
MATCH EXISTING

C.L. AIRLANE DR.

N1°32'25"E

AIRLANE DR.

C.L. I-30 MEDIAN CURVE 5
P.I. = 481+89.06
DELTA = 28°18'18" RT.
DOC = 1°25'00"
T = 1019.83'
L = 1998.01'
P.C. = 471+69.23
P.T. = 491+67.24
Ls = 420.00'
e = 0.054 '/'

EB I-30 CURVE 4
P.I. = 2503+93.61
DELTA = 19°34'44" LT.
DOC = 2°00'00"
T = 494.29'
L = 978.95'
P.C. = 2498+99.32
P.T. = 2508+78.27
Ls = 420.00'
e = +0.070 '/'

WB I-30 CURVE 3
P.I. = 3503+65.13
DELTA = 19°14'44" LT.
DOC = 1°45'00"
T = 555.11'
L = 1099.75'
P.C. = 3498+10.03
P.T. = 3509+09.78
Ls = 420.00'
e = -0.062 '/'

C.L. I-30 MEDIAN CURVE 6
P.I. = 503+67.34
DELTA = 19°14'44" LT.
DOC = 1°44'35"
T = 557.31'
L = 1104.12'
P.C. = 498+10.03
P.T. = 509+14.15
Ls = N/A
e = N/A

C.L. FRTG. RD. C CURVE 3
P.I. = 114+49.62
DELTA = 18°17'59" LT.
DOC = 2°00'00"
T = 461.42'
L = 914.98'
P.C. = 109+88.20
P.T. = 119+03.18
Ls = 200.00'
e = 0.028 '/'

STA. 490+00 TO STA. 504+00 - IN PLACE
1400 LIN. FT. WRSF
REMOVE

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

STA. 490+98 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = X'-0"
WITH 18" X 56' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 490+98 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 488+95 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 492+99 - CONSTRUCT
DROP INLET 3' LT. OF C.L. H = X'-0"
WITH 18" X 56' R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
CONNECT TO DROP INLET ON RT.
TYPE ST DROP INLET = 3'-0" X 3'-0"

STA. 492+99 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 490+98 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 495+03 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 492+99 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 497+07 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 6'-0"
WITH 36" X 81' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 496+42 RT.
TYPE ST DROP INLET = 6'-0" X 4'-0"

STA. 496+42 - CONSTRUCT
DROP INLET 56' RT. OF C.L. H = 6'-0"
WITH 36" X 134' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 495+03 RT.
TYPE ST DROP INLET = 6'-0" X 4'-0"

STA. 499+08 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 5'-0"
WITH 30" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 497+07 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 501+07 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 5'-0"
WITH 30" X 197' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 499+08 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

STA. 503+11 - CONSTRUCT
DROP INLET 4' RT. OF C.L. H = 5'-0"
WITH 30" X 202' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
CONNECT TO DROP INLET
AT STA. 501+07 RT.
TYPE ST DROP INLET = 3'-0" X 4'-0"

PLAN MAIN LANES
STA. 490+00 TO STA. 504+00

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FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12460

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	19	23

② PLAN STA. 504+00 TO STA. 518+00

C.L. I-30 MEDIAN CURVE 6
P.I. = 503+67.34
DELTA = 19°14'44" LT.
DOC = 1°44'35"
T = 557.31'
L = 1104.12'
P.C. = 498+10.03
P.T. = 509+14.15
Ls = N/A
e = N/A

C.L. BELL ST. STA. 41+82.80 =
C.L. SEVIER ST. STA. 51+72.94
∠ = 88°32'57"

C.L. BELL ST. CURVE 1
P.I. = 41+00.08
DELTA = 20°26'15" RT.
DOC = 20°00'00"
T = 51.64'
L = 102.19'
P.C. = 40+48.44
P.T. = 41+50.62
Ls = N/A
e = N.C.

C.L. FRTG. RD. D CURVE 4
P.I. = 150+80.75
DELTA = 11°26'23" LT.
DOC = 18°00'00"
T = 31.88'
L = 63.55'
P.C. = 150+48.87
P.C.C. = 151+12.42
Ls = N/A
e = N.C.

C.L. FRTG. RD. D CURVE 5
P.I. = 151+72.47
DELTA = 10°46'34" LT.
DOC = 9°00'00"
T = 60.04'
L = 119.73'
P.C.C. = 151+12.42
P.C.C. = 152+32.16
Ls = N/A
e = N.C.

C.L. FRTG. RD. D CURVE 6
P.I. = 153+00.95
DELTA = 6°11'06" LT.
DOC = 4°30'00"
R = 1273.24'
T = 68.79'
L = 137.44'
P.C.C. = 152+32.16
P.C.C. = 153+69.60
Ls = N/A
e = N.C.

C.L. FRTG. RD. D CURVE 7
P.I. = 154+35.56
DELTA = 2°58'02" LT.
DOC = 2°15'00"
T = 65.96'
L = 131.88'
P.C.C. = 153+69.60
P.T. = 155+01.49
Ls = N/A
e = N.C.

C.L. I-30 MEDIAN
P.I. = 517+41.16
DELTA = 0°20'00" LT.

WB I-30
P.I. = 3517+36.75
DELTA = 0°20'00" LT.

CONCRETE BARRIER WALL

STA.	STA.	LT. SIDE TYPE
3495+00.00	3509+06.27	D
3509+60.82	3509+90.82	SP-3
3509+90.82	3511+45.00	D
3511+45.00	3519+71.68	A

REMOVAL & DISPOSAL OF EXISTING IMPACT ATTENUATION BARRIER
STA. 509+30 RT. OF EB I-30 = 1 EACH
STA. 509+70 LT. OF WB I-30 = 1 EACH

STA. 504+00 - STA. 508+93
C.L. I-30 MEDIAN - IN PLACE
493 LIN. FT. WRSF
REMOVE

STA. 510+10 - STA. 516+04
C.L. I-30 MEDIAN - IN PLACE
5594 LIN. FT. WRSF
REMOVE

REMOVAL & DISPOSAL OF EXISTING CRASH CUSHION
STA. 516+25 I-30 MEDIAN = 1 EACH

REMOVAL AND DISPOSAL OF GUARDRAIL

STA.	STA.	LOCATION	UNIT
2507+14	2510+64	LT. OF EB I-30	350 LIN. FT.
3508+38	3511+88	RT. OF WB I-30	350 LIN. FT.

STA. 517+75.26
END CONC. BARR. WALL (MEDIAN TY. B)
END RECONSTRUCTION
BEGIN WIDENING

WB I-30 CURVE 3
P.I. = 3503+65.13
DELTA = 19°14'44" LT.
DOC = 1°45'00"
T = 555.11'
L = 1099.75'
P.C. = 3498+10.03
P.T. = 3509+09.78
Ls = 420.00'
e = -0.062 '/'

C.L. FRTG. RD. D
Δ = 149+61.21
DELTA = 38°20'26" RT.
C.L. BELL ST. STA. 40+00.00 =
C.L. SOUTH ST. STA. 23+74.41
∠ = 90°00'00"

C.L. SOUTH ST. CURVE 1
P.I. = 30+57.91
DELTA = 156°42'58" RT.
DOC = 28°00'00"
T = 993.17'
L = 559.70'
P.C. = 20+64.74
P.T. = 26+24.44
Ls = N/A
e = N.C.

C.L. FRONTAGE ROAD D
15° CURVE
40° CURVE

C.L. SEVIER ST. STA. 58+00.00 =
C.L. FRTG. RD. D STA. 158+20.30
∠ = 40°05'01"

STA. 155+04.40
END CURB TY. A

STA. 156+88.39
END CURB TY. A

STA. 200+44.72
END CURB TY. A

STA. 5+00.00
END CONSTRUCTION
MATCH EXISTING PAVEMENT

STA. 205+20.00
END CURB (TY. A)

480' MERGING TAPER

STA. 517+75.26
END CONC. BARR. WALL (MEDIAN TY. B)
END RECONSTRUCTION
BEGIN WIDENING

C.L. LEANDER ST. CURVE 1
P.I. = 63+12.26
DELTA = 52°53'43" LT.
DOC = 38°00'00"
T = 75.00'
L = 139.20'
P.C. = 62+37.25
P.T. = 63+12.26
Ls = N/A
e = N.C.

C.L. RAMP 2 CURVE 1
P.I. = 202+73.97
DELTA = 41°17'05" LT.
DOC = 1°00'00"
T = 214.33'
L = 428.46'
P.C. = 200+59.64
P.T. = 204+88.10
Ls = N/A
e = N.C.

CONCRETE BARRIER WALL

STA.	STA.	MEDIAN TYPE
499+20.00	508+81.03	C
508+81.03	509+11.03	SP-2
509+65.53	509+95.53	SP-2
509+95.53	510+80.00	C
510+80.00	517+75.26	B

C.L. SOUTH ST. CURVE 2
P.I. = 31+75.39
DELTA = 48°14'56" LT.
DOC = 14°00'00"
T = 183.28'
L = 344.63'
P.C. = 29+92.11
P.T. = 33+36.74
Ls = N/A
e = N.C.

CONCRETE BARRIER WALL

STA.	STA.	RT. SIDE TYPE
2497+60.00	2504+50.00	E
2504+50.00	2505+50.00	A
2505+50.00	2508+87.75	D
2508+87.75	2509+17.75	SP-2
2509+72.25	2510+02.25	SP-2
2510+02.25	2515+30.00	D
2515+30.00	2518+00.00	A

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

NOTE:
REFER TO SOUTH ST. PLANS FOR ADDITIONAL GEOMETRIC INFORMATION.

C.L. FRTG. RD. C CURVE 3
P.I. = 114+49.62
DELTA = 18°17'59" LT.
DOC = 2°00'00"
T = 461.42'
L = 914.98'
P.C. = 109+88.20
P.T. = 119+03.18
Ls = 200.00'
e = 0.028 '/'

EB I-30 CURVE 4
P.I. = 2503+93.61
DELTA = 19°34'44" LT.
DOC = 2°00'00"
T = 494.29'
L = 978.95'
P.C. = 2498+99.32
P.T. = 2508+78.27
Ls = 420.00'
e = +0.070 '/'

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
201+36.25	203+80.00	LT. OF RAMP 2 =	175	1 EACH	1 EACH

STA. 26+40 TO STA. 29+22 C.L. SOUTH ST. - IN PLACE
282'-3 15/16" X 46'-10" BRIDGE CONSISTING
OF 40'-40'-60'-60'-40'-40' COMPOSITE W-BEAM SPANS
REMOVE AS EXISTING BRIDGE STRCTURE = 1.00 LUMP SUM

REMOVAL & DISPOSAL OF PIER PROTECTION

STA. 509+35.35 TO STA. 509+69.08 LT. OF WB I-30 = 34 LIN. FT.
STA. 509+35.81 TO STA. 509+69.35 I-30 MEDIAN = 34 LIN. FT.
STA. 509+36.07 TO STA. 509+69.63 RT. OF EB I-30 = 34 LIN FT.

PLAN MAIN LANES
STA. 504+00 TO STA. 518+00

McNIEL CREEK
100 YR. FLOODPLAIN LIMIT
W. SOUTH ST.
SEVIER ST.
FRONTAGE ROAD D
LEANDER ST.
RAMP 2
EXIST. R/W
PROP. R/W & C/A
CONC. BARR. WALL (MEDIAN TY. C)
CONC. BARR. WALL (SIDE TY. A)
CONC. BARR. WALL (SIDE TY. D)
CONC. BARR. WALL (SIDE TY. E)
RETAINING WALL
RETAINING WALL 'XX'
SAWCUT
PROPOSED GUARDRAIL
CURB TY. A (TYP.)
CURB (TY. A) (TYP.)
C.L. SOUTH ST. RAMP A
C.L. SOUTH ST. RAMP B
C.L. SOUTH ST. RAMP C
C.L. SOUTH ST. RAMP D
C.L. FRONTAGE ROAD C
C.L. SEVIER ST. DWY.
C.L. LEANDER ST.
C.L. I-30 MEDIAN
WB I-30
EB I-30
I-30 MEDIAN

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AUGUST-2015

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				6	ARK.			
				JOB NO.		CA0601	20	23
				②	PLAN STA. 518+00 TO STA. 533+00			

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100 YR. FLOODPLAIN LIMIT

MUAQUA AVE.

McNEIL CREEK

EDGEMOOR TERRACE

PINEWOOD DR.

FRONTAGE ROAD D

RAMP 3

RAMP 2

SEVIER ST.

STA. 517+75.26
BEGIN WIDENING LT. FOR
CONC. BARR. WALL (SIDE TY. A)

STA. 517+75.26
END CONC. BARR. WALL (MEDIAN TY. A)
END RECONSTRUCTION

STA. 3519+71.68
END WIDENING LT.
END CONC. BARR. WALL (SIDE TY. A)
MATCH EXISTING CONC. BARR. WALL

30" C.M.P. RETAIN

30" R.C.P. RETAIN

EXIST. R/W

STA. 527+26 - IN PLACE
OVERHEAD SIGN STRUCTURE
RETAIN

END JOB CA0601
STA. 531+75.78
LOG MILE 116.23

10'
36'
+71.68
100' TRANSITION
48.7'
26'
12'
12'
24'
12'
10'
7.5'
2' R
6'
6'
15'
210
36'
12'

3520 3525 3530

N51°31'28"E

C.L. I-30 MEDIAN

STA. 517+75.26
BEGIN WIDENING RT.

SAWCUT

NOSE +75.78
38.00' RT.

+75.75

STA. 2525+56.71
BEGIN CONC. BARR. WALL
(SIDE TY. E)

CONC. BARR. WALL
(SIDE TY. SP-I)
REFER TO SPECIAL DETAILS

+75.78

STA. 2531+75.78
END WIDENING RT.
MATCH EXIST. PVM'T.

+00
+05
+03.67

N48°21'6"E

-0.020 '/'
207+94.11
+08.10

C.L. RAMP 2

P.C. 209+44.11
RAMP 2

-0.021 '/'
209+94.11

P.I. 211+02.79
RAMP 2

-0.021 '/'
212+11.38

P.T. 212+61.38
RAMP 2

PROPOSED
GUARDRAIL

-0.020 '/'
2526+07.13

480' MERGING TAPER

EXIST. R/W

700' ACCELERATION LANE

EB I-30 STA. 2524+57.15, 40.50' RT. =
C.L. RAMP 2 STA. 212+61.38

300' TAPER

100 YR. FLOODPLAIN LIMIT

STA. 2531+75.78
END CONC. BARR. WALL
(SIDE TY. SP-I)
MATCH EXIST. BARR. WALL

+34.00
150.15

STA. 518+16 - CONSTRUCT
DROP INLET 64' RT. OF C.L. H = 5'-0"
WITH 30" X 102' R.C. PIPE CULVERT
(CLASS IV) (TYPE 3 BEDDING)
+34.44
226.24 CONNECT TO DROP INLET
AT STA. 519+20 RT.
TYPE RM DROP INLET = 5'-0" X 4'-0"

STA. 519+23 - IN PLACE
DROP INLET 66' RT. OF C.L. H = 6'-6" - REMOVE
WITH 30" X 53' R.C. PIPE CULVERT INLET
ON A 2°30' LT. FWD. SKEW WITH HDWL. LT.
AND 30" X 140' R.C. PIPE CULVERT
ON A 2°30' LT. FWD. SKEW
TO DROP INLET 76' LT. OF C.L. H = 14'-10" - RETAIN
WITH 30" X 72' R.C. PIPE CULVERT
ON A 2°30' LT. FWD. SKEW
TO MANHOLE 150' LT. OF C.L. H = 17'-2" - RETAIN
WITH 36" X 107' C.M. PIPE CULVERT OUTLET
ON A 57°30' LT. FWD. SKEW
Q50 = 56.4 CFS D.A. = 10.3 ACRES

STA. 519+20 - CONSTRUCT
JUNCTION BOX 60' RT. OF C.L. H = 7'-0"
CONNECT TO EXISTING PIPE
WITH 30" R.C. PIPE CULVERT
(CLASS III) (TYPE 3 BEDDING)
30" R.C. PIPE = 18 LIN. FT.
TYPE ST JUNCTION BOX = 3'-0" X 4'-0"

C.L. RAMP 2 CURVE 2
P.I. = 211+02.79
DELTA = 3°10'22" RT.
DOC = 1°00'00"
T = 158.68'
L = 317.27'
P.C. = 209+44.11
P.T. = 212+61.38
Ls = 200.00'
e = 0.021 '/'

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
2525+85	2525+85	15'	RT.	7'	11.67
2526+35	2526+35	15'	RT.	7'	11.67
2526+85	2526+85	15'	RT.	7'	11.67
2527+35	2527+35	15'	RT.	7'	11.67
2527+85	2527+85	15'	RT.	7'	11.67
2528+35	2528+35	15'	RT.	7'	11.67
2529+00	2529+00	15'	RT.	7'	11.67
2529+44	2530+04	60'	RT.	4'	26.67

STA.	STA.	LOCATION	GUARDRAIL (TY. A) LIN. FT.	GUARDRAIL TERMINAL (TY. 2)	THRIE BEAM GUARDRAIL TERMINAL
2523+37.96	2525+56.71	RT. OF EB I-30 =	150	1 EACH	1 EACH

STA. 528+16 - IN PLACE
TRI. 10' X 10' X 228' R.C. BOX CULVERT
ON A 30° RT. FWD. SKEW
WITH WINGS LT. & RT.
RETAIN

100 YR. FLOODPLAIN LIMIT

McNEIL CREEK

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

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PLAN MAIN LANES
STA. 518+00 TO STA. 533+00

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				6	ARK.			
				JOB NO.		CA0601	21	23

2

C.L. HWY. 67 CURVE 1
P.I. = 502+09.37
DELTA = 7°04'05" LT.
DOC = 5°00'00"
T = 70.77'
L = 141.36'
P.C. = 501+38.60
P.C.C. = 502+79.96
Ls = N/A
e = N/A

C.L. HWY. 67 CURVE 2
P.I. = 505+75.37
DELTA = 54°32'59" LT.
DOC = 10°00'00"
T = 295.41'
L = 545.50'
P.C. = 502+79.96
P.T. = 508+25.46
Ls = N/A
e = N/A

C.L. HWY. 67 CURVE 3
P.I. = 516+88.52
DELTA = 17°44'18" LT.
DOC = 2°30'00"
T = 357.62'
L = 709.53'
P.C. = 513+30.89
P.T. = 520+40.42
Ls(1) = 360.00'
Ls(2) = 600.00'
e = 0.067 '/'

C.L. FRONTAGE ROAD A CURVE 3
P.I. = 44+07.19
DELTA = 30°11'55" LT.
DOC = 30°00'00"
T = 51.53'
L = 100.66'
P.C. = 43+55.66
P.T. = 44+56.32
Ls = N/A
e = N/A

STA. 506+20 - IN PLACE
24" X 46' R.C. PIPE CULVERT
WITH HDWLS. LT. & RT.
RETAIN

STA. 511+30.89 - IN PLACE
18" X 25' R.C. PIPE CULVERT LT. SIDE DRAIN
REMOVE & INSTALL
18" X 60' PIPE CULVERT LT. SIDE DRAIN
CONSTRUCT APPROACH = XX CU. YDS.

STA. 512+88.95 - IN PLACE
18" X 25' R.C. PIPE CULVERT LT. SIDE DRAIN
WITH F.E.S.
REMOVE & INSTALL
18" X 70' PIPE CULVERT LT. SIDE DRAIN
CONSTRUCT APPROACH = XX CU. YDS.

OBLITERATE EXISTING ROADWAY

REMOVE DROP INLET/PIPE
(REFER TO DRAINAGE NOTES)

P.C. 501+38.60 HWY. 67
P.I. 502+09.37 HWY. 67
P.C.C. 502+79.96 HWY. 67
EXIST. R/W
505
N79°34'37"E
N25°1'38"E
P.I. 505+75.37 HWY. 67
24" R.C.P. RET.IN 24'
50' TRANS.
CONST. LIMIT
P.T. 508+25.46 HWY. 67
PROP. R/W & C/A
EXIST. R/W
600' MERGING TAPER
T.C.E.
16'
40'
20' R
20' R (TYP.)
30' R
25' R
P.C. 513+30.89 HWY. 67
CONST. LIMIT
P.C. 43+ FRTG. RD
P.I. 44+07.19 FRTG. RD. A
P.T. 44+56.32 FRTG. RD. A
10'
3'
22'
11'
0.067 '/' 514+43.39
0.020 '/' 512+00.29
0.020 '/' 509+93.39
0.068 '/' 507+43.39
0.020 '/' 508+79.75
N24°16'38"E
N25°46'38"E
PROP. R/W
CONST. LIMIT
200' TAPER
T.C.E.
STA. 506+50.00
MATCH EXISTING PAVEMENT
BEGIN WIDENING & OVERLAY
C.L. HWY. 67
STA. 508+50 - CONSTRUCT
APPROACH ON RT. = XX CU. YDS.
STA. 507+05 - CONSTRUCT
APPROACH ON RT. = XX CU. YDS.
STA. 511+50
END WIDENING & OVERLAY
BEGIN RECONSTRUCTION
600' TAPER
PROP. R/W & C/A
STA. 511+40 - CONSTRUCT
APPROACH ON RT. = XX CU. YDS.

AHTD MAINTENANCE OFFICE

REFER TO SURVEY CONTROL DETAIL SHEETS
FOR HORIZONTAL & VERTICAL CONTROL DATA.

STA. 506+50.00 MATCH EXIST. SUPERELEVATION:
LT. LANE (-0.066 '/')
RT. LANE (+0.028 '/')
STA. 507+43.39 MAX. SUPERELEVATION (0.068 '/')
STA. 508+79.75 END SUPERELEVATION (0.020 '/')
STA. 509+93.39 END TRANSITION (N.C.)
STA. 509+93.39 BEGIN TRANSITION (N.C.)
STA. 512+00.29 BEGIN SUPERELEVATION (0.020 '/')
STA. 514+43.39 MAX. SUPERELEVATION (0.067 '/')

500'
NOTCH, WIDEN & OVERLAY
100'
TRANSITION
STA. 506+50.00 C.L. HWY. 67
BEGIN WIDENING & OVERLAY
ELEV. 327.37
1.52%
1.30%
-2.70%
V.P.C. 508+75.00
ELEV. 330.51
P.V.I. 510+25.00
ELEV. 332.45
PROFILE GRADE
V.P.C. 513+25.00
ELEV. 324.35
P.V.I. 506+50.00
ELEV. 327.37
P.V.I. 507+50.00
ELEV. 328.89
L.V.C. = 300.00'
G1 = 1.30%
G2 = -2.70%
e = -1.50'
K = 75
V.P.T. 511+75.00
ELEV. 328.40
STA. 511+50.00 C.L. HWY. 67
BEGIN RECONSTRUCTION
ELEV. 329.04
EXISTING GROUND
@ C.L. HWY. 67

350 340 330 320 310 300 290 280

505+00 510+00

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SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

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				6	ARK.			
				JOB NO.		CA0601	22	23

(2) PLAN & PROFILE STA. 514+00 TO 528+00

(2) HWY. 67 INSIDE PAV'T. EDGE
P.C. = 513+04.25, 5.29' LT.
P.T. = 520+62.42, 11.00' LT.
DELTA = 16°59'17" LT.
DOC = 2°15'00"
T = 380.30'
L = 755.03'

(1) HWY. 67 RT. INSIDE PAV'T. EDGE
P.C. = 513+19.23, 5.49' RT.
P.T. = 520+56.15, 11.00' RT.
DELTA = 18°29'17" LT.
DOC = 2°30'00"
T = 373.01'
L = 739.53'

C.L. HWY. 67 CURVE 3
P.I. = 516+88.52
DELTA = 17°44'18" LT.
DOC = 2°30'00"
T = 357.62'
L = 709.53'
P.C. = 513+30.89
P.T. = 520+40.42
Ls(1) = 360.00'
Ls(2) = 600.00'
e = 0.067 '/'

C.L. HWY. 67 RT. TURN LANES CURVE 1
P.I. = 521+15.68
DELTA = 31°58'38" RT
DOC = 24°00'00"
T = 68.41'
L = 133.24'
P.C. = 520+47.27
P.T. = 521+80.51
Ls = N/A
e = N/A

STA. 516+85 - IN PLACE 18" X 48' R.C. PIPE CULVERT WITH HDWLS. LT. & RT. REMOVE.

REFER TO MAIN LANE & FR PLAN & PROFILE SHEETS FOR ADDITIONAL DRAINAGE NOTES

STA. 519+45 - IN PLACE 18" X 50' R.C. PIPE CULVERT WITH HDWLS. LT. & RT. REMOVE

STA. 520+12 - CONSTRUCT DBL. 30" X 254' R.C. PIPE CULVERT (CLASS III) (TYPE 3 BEDDING) ON A 28°35' RT. FWD. SKEW WITH F.E.S. LT. & RT. 30" F.E.S. = 4 EACH
Q50 = 61.9 CFS D.A. = 16.2 ACRES

C.L. HWY. 67 STA. 515+40.46 =
C.L. FRONTAGE ROAD A STA. 45+00.00
∠ = 90°00'00"

C.L. HWY. 67 RT. TURN LANES STA. 517+60.00 =
C.L. HWY. 67 STA. 517+60.00, 41.94' RT.

C.L. HWY. 67 STA. 520+99.90 =
C.L. RAMP 1 STA. 118+32.96 =
C.L. RAMP 2 STA. 200+00.00
∠ = 60°29'22"

C.L. HWY. 67 RAMP 4 P.C. STA. 400+00.00 =
C.L. I-30 MEDIAN STA. 395+94.50, 54.17' LT.

C.L. HWY. 67 STA. 522+98.74 =
C.L. I-30 MEDIAN STA. 396+88.28
∠ = 49°56'24"

C.L. RAMP 4 STA. 401+40.04 =
C.L. HWY. 67 STA. 523+71.66
∠ = 48°5'20"

C.L. HWY. 67 STA. 525+90.53, 36.50' LT. =
C.L. RAMP 5 STA. 519+92.72

C.L. HWY. 67 STA. 528+00.00, 36.50' RT. =
C.L. RAMP 4 STA. 412+08.15

C.L. HWY. 67 RT. TURN LANES STA. 523+08.26 =
C.L. HWY. 67 RAMP 2 STA. 202+54.55, 4.16' LT.

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

CONCRETE DITCH PAVING (TYPE B)

STA.	STA.	LENGTH	SIDE	"W"	SQ. YDS.
515+78.28	520+67.00	488.72'	MED.	VAR.	682.38

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL & VERTICAL CONTROL DATA.

STA. 514+43.39 MAX. SUPERELEVATION (0.067 '/')
STA. 518+90.42 MAX. SUPERELEVATION (0.067 '/')
STA. 522+14.56 END SUPERELEVATION (0.020 '/')
STA. 522+94.43 BEGIN TRANSITION LT. (0.020 '/')
STA. 524+90.42 END TRANSITION RT. (0.020 '/')
STA. 526+85.73 BEGIN SUPERELEVATION (0.020 '/')
STA. 529+69.43 MAX. SUPERELEVATION (0.049 '/')

L.V.C. = 300.00'
G1 = -2.70%
G2 = -3.50%
e = -0.30'
K = 376

P.V.I. 514+75.00
ELEV. 320.30

V.P.T. 516+25.00
ELEV. 315.05

V.P.C. 519+22.50
ELEV. 304.64

P.V.I. 522+60.00
ELEV. 292.82

V.P.T. 525+97.50
ELEV. 297.38

V.P.C. 527+80.00
ELEV. 299.85

C.L. FRONTAGE ROAD A +40.46

C.L. RAMP 1/RAMP 2 +99.90

C.L. I-30 MEDIAN +98.74

PROFILE GRADE

EXISTING GROUND @ C.L. HWY. 67

-3.50%

1.35%

L.V.C. = 675.00'
G1 = -3.50%
G2 = 1.35%
e = 4.09'
K = 139

EB I-30

WB I-30

340 330 320 310 300 290 280 270

515+00 520+00 525+00

PLAN & PROFILE
HWY. 67
STA. 514+00 TO STA. 528+00

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PRELIMINARY

PRELIMINARY
FOR REVIEW ONLY

SHAHRIAR AZAD, P.E., 12404

AUGUST-2015

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601	23	23

② PLAN & PROFILE STA. 528+00 TO 542+00

OBLITERATE EXISTING ROADWAY
REMOVE DROP INLET/PIPE (REFER TO DRAINAGE NOTES)

C.L. HWY. 67 CURVE 4
P.I. = 530+01.73
DELTA = 7°01'41" RT.
DOC = 1°45'00"
T = 201.05'
L = 401.60'
P.C. = 528+00.68
P.T. = 532+02.28
Ls(1) = 675.00'
Ls(2) = 575.00'
e = 0.049 '/'

C.L. HWY. 67 CURVE 5
P.I. = 538+54.30
DELTA = 5°04'05" LT.
DOC = 2°30'00"
T = 101.66'
L = 203.19'
P.C. = 537+52.64
P.T. = 539+54.30
Ls = 300.00'
e = 0.067 '/'

STA. 536+26 - CONSTRUCT 48" X 119' R.C. PIPE CULVERT ON A 4° RT. FWD. SKEW (CLASS IV) (TYPE 3 BEDDING) WITH F.E.S. LT. & RT. 48" F.E.S. = 2 EACH
Q50 = 88.0 CFS D.A. = 13.0 ACRES

STA. 536+40 - IN PLACE 24" X 43' R.C. PIPE CULVERT WITH HDWLS. LT. & RT. REMOVE

STA. 541+24 - IN PLACE 18" X 34' R.C. PIPE CULVERT WITH HDWLS. LT. & RT. RETAIN

STA. 542+00.00 END RECONSTRUCTION MATCH EXISTING PAVEMENT

PROPOSED GUARDRAIL LOCATION		GUARDRAIL (TYPE A)	GUARDRAIL TERMINAL (TYPE I)	GUARDRAIL TERMINAL (TYPE 2)
STA. 528+36.00 TO STA. 78+25.38	SW CORNER OF INTERSECTION OF HWY. 67 & FRTG. RD. B	175 LIN. FT.	I EACH	I EACH

REFER TO SURVEY CONTROL DETAIL SHEETS FOR HORIZONTAL & VERTICAL CONTROL DATA.

STA. 526+85.73 BEGIN SUPERELEVATION (0.020 '/')
STA. 529+69.43 MAX. SUPERELEVATION (0.049 '/')
STA. 530+58.53 MAX. SUPERELEVATION (0.049 '/')
STA. 533+00.20 END SUPERELEVATION (0.020 '/')
STA. 535+27.64 BEGIN TRANSITION RT. (0.020 '/')
STA. 536+33.53 END TRANSITION LT. (0.020 '/')
STA. 536+65.57 BEGIN SUPERELEVATION (0.020 '/')
STA. 538+27.64 MAX. SUPERELEVATION (0.067 '/')
STA. 538+80.83 MAX. SUPERELEVATION (0.067 '/')
STA. 540+42.90 END SUPERELEVATION (0.020 '/')
STA. 541+80.83 END TRANSITION RT. (N.C.)

V.P.C. 527+80.00 ELEV. 299.85
C.L. RAMP 4 +06.71
P.V.I. 530+30.00 ELEV. 303.23
C.L. RAMP 3 +51.31
PROFILE GRADE
C.L. FRONTAGE ROAD B +30.51
V.P.T. 532+80.00 ELEV. 300.73
L.V.C. = 500.00'
GI = 1.35%
G2 = -1.00%
e = -1.47'
K = 213
-1.00%
V.P.C. 538+50.00 ELEV. 295.04
L.V.C. = 200.00'
GI = -1.00%
G2 = -0.80%
e = 0.05'
K = 1011
300' NOTCH, WIDEN & OVERLAY
100' TRANSITION
V.P.I. 539+50.00 ELEV. 294.05
-0.80%
V.P.T. 540+50.00 ELEV. 293.25
-0.70%
V.P.I. 541+00.00 ELEV. 292.85
P.V.I. 542+00.00 ELEV. 292.15
STA. 542+00.00 C.L. HWY. 67 END RECONSTRUCTION ELEV. 292.15

330 320 310 300 290 280 270 260

530+00 535+00 540+00

PLAN & PROFILE HWY. 67 STA. 528+00 TO STA. 542+00

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mbinkley

APPENDIX D – Highway Capacity Manual 2010 Analysis

No Build

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY-67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1970*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1177*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.8*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1610*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*29*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.873*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1011*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY. 70 / HWY. 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2170*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1291*	pc/h/ln
S	*74.1*	mph
D = v_p / S	*17.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2010*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*28*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.877*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1256*	pc/h/ln
S	*74.3*	mph
D = v_p / S	*16.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3400*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1292*	pc/h/ln
S	*69.9*	mph
D = v_p / S	*18.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2485*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*23*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.897*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1013*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SEVIER ST / HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4100*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1573*	pc/h/ln
S	*68.4*	mph
D = v_p / S	*23.0*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SEVIER ST/HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3235*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1289*	pc/h/ln
S	*69.9*	mph
D = v_p / S	*18.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1260*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*781*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*10.4*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1300*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*852*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*11.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/23/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3570*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2075*	pc/h/ln
S	*61.1*	mph
D = v_p / S	*34.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/23/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2810*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1710*	pc/h/ln
S	*67.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1300*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*805*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*10.7*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1400*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*917*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*12.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST. ON/OFF RAMPS*
Date Performed	*6/23/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3220*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1845*	pc/h/ln
S	*65.2*	mph
D = v_p / S	*28.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/23/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2560*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*21*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.905*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1551*	pc/h/ln
S	*68.6*	mph
D = v_p / S	*22.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	162	L_{down} =	3075 ft
V_u =	veh/h	Freeway Volume, V_F	2170	V_D =	1600 veh/h
		Ramp Volume, V_R	200		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2170	0.96	Level	17	0	0.922	0.95	2582
Ramp	200	0.96	Level	0	0	1.000	0.95	219
UpStream								
DownStream	1600	0.96	Rolling	1	0	0.985	0.95	1781

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2582 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2582	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2363	Exhibit 13-8	4800	No
V_R	219	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2582	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.253 (Exhibit 13-12)

S_R= 64.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 64.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	162	L_{down} =	3075 ft
V_u =	veh/h	Freeway Volume, V_F	2010	V_D =	1200 veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2010	0.96	Level	28	0	0.877	0.95	2513
Ramp	400	0.96	Level	2	0	0.990	0.95	443
UpStream								
DownStream	1200	0.96	Rolling	3	0	0.957	0.95	1375

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2513 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2513	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2070	Exhibit 13-8	4800	No
V_R	443	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2513	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.273 (Exhibit 13-12)

S_R= 64.3 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 64.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9825 ft	Deceleration Lane Length L_D	162	L_{down} =	ft
V_u =	910 veh/h	Freeway Volume, V_F	2170	V_D =	veh/h
		Ramp Volume, V_R	200		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2170	0.96	Level	17	0	0.922	0.95	2582
Ramp	200	0.96	Level	0	0	1.000	0.95	219
UpStream	910	0.96	Level	3	0	0.985	0.95	1013
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2582 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2582	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2363	Exhibit 13-8	4800	No
V_R	219	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2582	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.253 (Exhibit 13-12)

S_R= 64.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 64.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9825 ft	Deceleration Lane Length L_D	162	L_{down} =	ft
V_u =	710 veh/h	Freeway Volume, V_F	2010	V_D =	veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2010	0.96	Level	28	0	0.877	0.95	2513
Ramp	400	0.96	Level	2	0	0.990	0.95	443
UpStream	710	0.96	Level	5	0	0.976	0.95	798
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2513 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2513	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2070	Exhibit 13-8	4800	No
V_R	443	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2513	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.273 (Exhibit 13-12)

S_R= 64.3 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 64.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	157	L_{down} =	2171 ft
V_u =	veh/h	Freeway Volume, V_F	1300	V_D =	910 veh/h
		Ramp Volume, V_R	40		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1300	0.96	Level	26	0	0.885	0.95	1611
Ramp	40	0.96	Rolling	0	0	1.000	0.95	44
UpStream								
DownStream	910	0.96	Level	3	0	0.985	0.95	1013

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1611 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1611	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1567	Exhibit 13-8	4800	No
V_R	44	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1611	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.497 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 2171 ft
V_u = veh/h	Deceleration Lane Length L_D: 157	V_D = 710 veh/h
	Freeway Volume, V_F: 1400	
	Ramp Volume, V_R: 100	
	Freeway Free-Flow Speed, S_{FF}: 73.6	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1400	0.96	Level	39	0	0.837	0.95	1834
Ramp	100	0.96	Rolling	22	0	0.752	0.95	146
UpStream								
DownStream	710	0.96	Level	5	0	0.976	0.95	798

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1834 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1834	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1688	Exhibit 13-8	4800	No
V_R	146	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1834	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.506 (Exhibit 13-12)

S_R= 57.6 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2180 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	880 veh/h	Freeway Volume, V_F	4100	V_D =	veh/h
		Ramp Volume, V_R	700		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4100	0.96	Level	10	0	0.952	0.95	4720
Ramp	700	0.96	Level	1	0	0.995	0.95	771
UpStream	880	0.96	Level	8	0	0.962	0.95	1004
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8299.99 (Equation 13-12 or 13-13)

P_{FD} = 0.607 using Equation (Exhibit 13-7)

V_{12} = 3166 pc/h

V_3 or V_{av34} 1554 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4720	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3949	Exhibit 13-8	7200	No
V_R	771	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3166	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.302 (Exhibit 13-12)

S_R= 62.7 mph (Exhibit 13-12)

S_0= 76.5 mph (Exhibit 13-12)

S = 66.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2180 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	675 veh/h	Freeway Volume, V_F	3235	V_D =	veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3235	0.96	Level	18	0	0.917	0.95	3866
Ramp	750	0.96	Level	1	0	0.995	0.95	826
UpStream	675	0.96	Level	3	0	0.985	0.95	751
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 7730.95 (Equation 13-12 or 13-13)

P_{FD} = 0.625 using Equation (Exhibit 13-7)

V_{12} = 2727 pc/h

V_3 or V_{av34} 1139 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3866	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3040	Exhibit 13-8	7200	No
V_R	826	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2727	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.307 (Exhibit 13-12)

S_R= 62.6 mph (Exhibit 13-12)

S_0= 78.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5160 ft
V_u = veh/h	Deceleration Lane Length L_D: 558	V_D = 880 veh/h
	Freeway Volume, V_F: 3570	
	Ramp Volume, V_R: 350	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3570	0.96	Level	12	0	0.943	0.95	4149
Ramp	350	0.96	Level	38	0	0.840	0.95	457
UpStream								
DownStream	880	0.96	Level	8	0	0.962	0.95	1004

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4149 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4149	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3692	Exhibit 13-8	4800	No
V_R	457	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4149	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 34.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.534 (Exhibit 13-12)

S_R= 55.8 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.8 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 6700 ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = 1600 veh/h	Deceleration Lane Length L_D: 558	V_D = veh/h
	Freeway Volume, V_F: 3570	
	Ramp Volume, V_R: 350	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3570	0.96	Level	12	0	0.943	0.95	4149
Ramp	350	0.96	Level	38	0	0.840	0.95	457
UpStream	1600	0.96	Rolling	1	0	0.985	0.95	1781
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4149 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4149	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3692	Exhibit 13-8	4800	No
V_R	457	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4149	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 34.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.534 (Exhibit 13-12)

S_R= 55.8 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.8 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5160 ft
V_u = veh/h	Deceleration Lane Length L_D: 558	V_D = 675 veh/h
	Freeway Volume, V_F: 2810	
	Ramp Volume, V_R: 250	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2810	0.96	Level	22	0	0.901	0.95	3420
Ramp	250	0.96	Level	36	0	0.847	0.95	323
UpStream								
DownStream	675	0.96	Level	3	0	0.985	0.95	751

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3420 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3420	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3097	Exhibit 13-8	4800	No
V_R	323	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3420	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.522 (Exhibit 13-12)

S_R= 56.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 56.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 6700 ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = 1200 veh/h	Deceleration Lane Length L_D: 558	V_D = veh/h
	Freeway Volume, V_F: 2810	
	Ramp Volume, V_R: 250	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2810	0.96	Level	22	0	0.901	0.95	3420
Ramp	250	0.96	Level	36	0	0.847	0.95	323
UpStream	1200	0.96	Rolling	3	0	0.957	0.95	1375
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3420 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3420	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3097	Exhibit 13-8	4800	No
V_R	323	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3420	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.522 (Exhibit 13-12)

S_R= 56.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 56.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	580
Deceleration Lane Length L_D	
Freeway Volume, V_F	1970
Ramp Volume, V_R	1600
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 6700 ft

V_D = 350 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	18	0	0.917	0.95	2354
Ramp	1600	0.96	Rolling	1	0	0.985	0.95	1781
UpStream								
DownStream	350	0.96	Level	38	0	0.840	0.95	457

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2354 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4135	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4135	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 33.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.507 (Exibit 13-11)

S_R = 56.7 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 56.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 6700 ft	Acceleration Lane Length, L_A: 580	L_{down} = ft
V_u = 250 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1610	
	Ramp Volume, V_R: 1200	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1610	0.96	Level	29	0	0.873	0.95	2021
Ramp	1200	0.96	Rolling	3	0	0.957	0.95	1375
UpStream	250	0.96	Level	36	0	0.847	0.95	323
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2021 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3396	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3396	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.379 (Exibit 13-11)

S_R = 60.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 3075 ft

V_u = 200 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	580
Deceleration Lane Length L_D	
Freeway Volume, V_F	1970
Ramp Volume, V_R	1600
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	18	0	0.917	0.95	2354
Ramp	1600	0.96	Rolling	1	0	0.985	0.95	1781
UpStream	200	0.96	Level	0	0	1.000	0.95	219
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2354 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4135	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4135	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 33.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.507 (Exibit 13-11)

S_R = 56.7 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 56.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 3075 ft	Acceleration Lane Length, L_A: 580	L_{down} = ft
V_u = 400 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1610	
	Ramp Volume, V_R: 1200	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1610	0.96	Level	29	0	0.873	0.95	2021
Ramp	1200	0.96	Rolling	3	0	0.957	0.95	1375
UpStream	400	0.96	Level	2	0	0.990	0.95	443
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2021 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3396	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3396	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.379 (Exibit 13-11)

S_R = 60.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 795	L_{down} = 9825 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 200 veh/h
	Freeway Volume, V_F: 1260	
	Ramp Volume, V_R: 910	
	Freeway Free-Flow Speed, S_{FF}: 73.1	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1260	0.96	Level	26	0	0.885	0.95	1561
Ramp	910	0.96	Level	3	0	0.985	0.95	1013
UpStream								
DownStream	200	0.96	Level	0	0	1.000	0.95	219

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1561 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2574	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2574	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 20.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.293 (Exibit 13-11)

S_R = 64.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 795	L_{down} = 9825 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 400 veh/h
	Freeway Volume, V_F: 1300	
	Ramp Volume, V_R: 710	
	Freeway Free-Flow Speed, S_{FF}: 73.1	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1300	0.96	Level	39	0	0.837	0.95	1703
Ramp	710	0.96	Level	5	0	0.976	0.95	798
UpStream								
DownStream	400	0.96	Level	2	0	0.990	0.95	443

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1703 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2501	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2501	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 19.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.289 (Exibit 13-11)

S_R = 64.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2171 ft

V_u = 40 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	795
Deceleration Lane Length L_D	
Freeway Volume, V_F	1260
Ramp Volume, V_R	910
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1260	0.96	Level	26	0	0.885	0.95	1561
Ramp	910	0.96	Level	3	0	0.985	0.95	1013
UpStream	40	0.96	Rolling	0	0	1.000	0.95	44
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1561 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2574	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2574	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.293 (Exibit 13-11)

S_R = 64.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 2171 ft	Acceleration Lane Length, L_A: 795	L_{down} = ft
V_u = 100 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 1300	
	Ramp Volume, V_R: 710	
	Freeway Free-Flow Speed, S_{FF}: 73.1	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1300	0.96	Level	39	0	0.837	0.95	1703
Ramp	710	0.96	Level	5	0	0.976	0.95	798
UpStream	100	0.96	Rolling	22	0	0.752	0.95	146
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1703 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2501	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2501	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 19.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.289 (Exibit 13-11)

S_R = 64.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1270*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*25*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.727*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*957*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2360*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1721*	pc/h/ln
S	*66.9*	mph
D = v_p / S	*25.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*910*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*581*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*7.7*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1660*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1060*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*14.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1370*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.893*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*841*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*11.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2760*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1680*	pc/h/ln
S	*69.9*	mph
D = v_p / S	*24.0*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1820*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*19*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.913*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*728*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*10.4*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3610*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1432*	pc/h/ln
S	*69.4*	mph
D = v_p / S	*20.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (3 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1720*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*685*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.8*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (3 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3660*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1451*	pc/h/ln
S	*69.3*	mph
D = v_p / S	*20.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*South St Ramp/HWY 67-229 Ramp*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1970*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*16*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.926*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1166*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/23/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4160*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*15*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2452*	pc/h/ln
S	*51.8*	mph
D = v_p / S	*47.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (2 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1720*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1028*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/23/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (2 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3660*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2177*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*36.9*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*32*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*636*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*8.5*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1700*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1086*	pc/h/ln
S	*74.9*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	352	L_{down} =	2194 ft
V_u =	veh/h	Freeway Volume, V_F	1370	V_D =	90 veh/h
		Ramp Volume, V_R	460		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1370	0.96	Level	24	0	0.893	0.95	1682
Ramp	460	0.96	Rolling	8	0	0.893	0.95	565
UpStream								
DownStream	90	0.96	Rolling	0	0	1.000	0.95	99

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1682 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1682	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1117	Exhibit 13-8	4800	No
V_R	565	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1682	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 15.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.284 (Exhibit 13-12)

S_R= 63.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	352	L_{down} =	2194 ft
V_u =	veh/h	Freeway Volume, V_F	2760	V_D =	40 veh/h
		Ramp Volume, V_R	1100		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2760	0.96	Level	22	0	0.901	0.95	3359
Ramp	1100	0.96	Rolling	1	0	0.985	0.95	1224
UpStream								
DownStream	40	0.96	Rolling	10	0	0.870	0.95	50

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3359 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3359	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2135	Exhibit 13-8	4800	No
V_R	1224	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3359	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.343 (Exhibit 13-12)

S_R= 62.1 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	352	L_{down} =	ft
V_u =	100 veh/h	Freeway Volume, V_F	1370	V_D =	veh/h
		Ramp Volume, V_R	460		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1370	0.96	Level	24	0	0.893	0.95	1682
Ramp	460	0.96	Rolling	8	0	0.893	0.95	565
UpStream	100	0.96	Rolling	0	0	1.000	0.95	110
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1682 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1682	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1117	Exhibit 13-8	4800	No
V_R	565	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1682	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 15.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.284 (Exhibit 13-12)

S_R= 63.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	352	L_{down} =	ft
V_u =	400 veh/h	Freeway Volume, V_F	2760	V_D =	veh/h
		Ramp Volume, V_R	1100		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2760	0.96	Level	22	0	0.901	0.95	3359
Ramp	1100	0.96	Rolling	1	0	0.985	0.95	1224
UpStream	400	0.96	Rolling	1	0	0.985	0.95	445
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3359 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3359	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2135	Exhibit 13-8	4800	No
V_R	1224	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3359	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.343 (Exhibit 13-12)

S_R= 62.1 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5145 ft
V_u = veh/h	Deceleration Lane Length L_D: 153	V_D = 250 veh/h
	Freeway Volume, V_F: 2120	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2120	0.96	Level	16	0	0.926	0.95	2511
Ramp	400	0.96	Level	6	0	0.971	0.95	452
UpStream								
DownStream	250	0.96	Level	3	0	0.985	0.95	278

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1845 pc/h

V_3 or V_{av34} 666 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2511	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2059	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1845	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 63.6 mph (Exhibit 13-12)

S_0= 78.7 mph (Exhibit 13-12)

S = 67.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5145 ft
V_u = veh/h	Deceleration Lane Length L_D: 153	V_D = 500 veh/h
	Freeway Volume, V_F: 4110	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4110	0.96	Level	15	0	0.930	0.95	4845
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream								
DownStream	500	0.96	Level	3	0	0.985	0.95	556

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.616 using Equation (Exhibit 13-7)

V_{12} = 3176 pc/h

V_3 or V_{av34} 1669 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4845	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4344	Exhibit 13-8	7200	No
V_R	501	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3176	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.278 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 76.0 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	300 veh/h	Freeway Volume, V_F	2120	V_D =	veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2120	0.96	Level	16	0	0.926	0.95	2511
Ramp	400	0.96	Level	6	0	0.971	0.95	452
UpStream	300	0.96	Level	1	0	0.995	0.95	331
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 3506.32 (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1845 pc/h

V_3 or V_{av34} 666 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2511	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2059	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1845	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 63.6 mph (Exhibit 13-12)

S_0= 78.7 mph (Exhibit 13-12)

S = 67.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	500 veh/h	Freeway Volume, V_F	4110	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4110	0.96	Level	15	0	0.930	0.95	4845
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream	500	0.96	Level	0	0	1.000	0.95	548
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 3796.09 (Equation 13-12 or 13-13)

P_{FD} = 0.616 using Equation (Exhibit 13-7)

V_{12} = 3176 pc/h

V_3 or V_{av34} 1669 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4845	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4344	Exhibit 13-8	7200	No
V_R	501	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3176	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.278 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 76.0 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	103	L_{down} =	1919 ft
V_u =	veh/h	Freeway Volume, V_F	1970	V_D =	100 veh/h
		Ramp Volume, V_R	700		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	16	0	0.926	0.95	2333
Ramp	700	0.96	Level	6	0	0.971	0.95	791
UpStream								
DownStream	100	0.96	Rolling	0	0	1.000	0.95	110

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2333 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2333	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1542	Exhibit 13-8	4800	No
V_R	791	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2333	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.304 (Exhibit 13-12)

S_R= 63.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	103	L_{down} =	1919 ft
V_u =	veh/h	Freeway Volume, V_F	4160	V_D =	400 veh/h
		Ramp Volume, V_R	1800		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4160	0.96	Level	15	0	0.930	0.95	4904
Ramp	1800	0.96	Level	2	0	0.990	0.95	1993
UpStream								
DownStream	400	0.96	Rolling	1	0	0.985	0.95	445

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4904 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4904	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	2911	Exhibit 13-8	4800	No
V_R	1993	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4904	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 45.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.412 (Exhibit 13-12)

S_R= 59.7 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 59.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6630 ft	Deceleration Lane Length L_D	103	L_{down} =	ft
V_u =	250 veh/h	Freeway Volume, V_F	1970	V_D =	veh/h
		Ramp Volume, V_R	700		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	16	0	0.926	0.95	2333
Ramp	700	0.96	Level	6	0	0.971	0.95	791
UpStream	250	0.96	Level	3	0	0.985	0.95	278
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2333 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2333	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1542	Exhibit 13-8	4800	No
V_R	791	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2333	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 23.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.304 (Exhibit 13-12)

S_R= 63.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6630 ft	Deceleration Lane Length L_D	103	L_{down} =	ft
V_u =	500 veh/h	Freeway Volume, V_F	4160	V_D =	veh/h
		Ramp Volume, V_R	1800		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4160	0.96	Level	15	0	0.930	0.95	4904
Ramp	1800	0.96	Level	2	0	0.990	0.95	1993
UpStream	500	0.96	Level	3	0	0.985	0.95	556
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4904 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4904	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	2911	Exhibit 13-8	4800	No
V_R	1993	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4904	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 45.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.412 (Exhibit 13-12)

S_R= 59.7 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 59.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	986
Deceleration Lane Length L_D	
Freeway Volume, V_F	1820
Ramp Volume, V_R	300
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 1634 ft

V_D = 400 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1820	0.96	Level	19	0	0.913	0.95	2185
Ramp	300	0.96	Level	1	0	0.995	0.95	331
UpStream								
DownStream	400	0.96	Level	6	0	0.971	0.95	452

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2101.33 (Equation 13-6 or 13-7)

P_{FM} = 0.621 using Equation (Exhibit 13-6)

V_{12} = 1358 pc/h

V_3 or V_{av34} 827 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1358 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2516	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1689	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.244 (Exibit 13-11)

S_R= 64.5 mph (Exhibit 13-11)

S_0= 70.5 mph (Exhibit 13-11)

S = 66.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	986	☐ No	☑ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	1634 ft
V_u =	veh/h	Freeway Volume, V_F	3610	V_D =	450 veh/h
		Ramp Volume, V_R	500		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3610	0.96	Level	17	0	0.922	0.95	4295
Ramp	500	0.96	Level	0	0	1.000	0.95	548
UpStream								
DownStream	450	0.96	Level	3	0	0.985	0.95	501

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2329.13 (Equation 13-6 or 13-7)

P_{FM} = 0.629 using Equation (Exhibit 13-6)

V_{12} = 2703 pc/h

V_3 or V_{av34} 1592 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2703 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4843	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3251	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.323 (Exibit 13-11)

S_R = 62.1 mph (Exhibit 13-11)

S_0 = 67.8 mph (Exhibit 13-11)

S = 63.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2194 ft

V_u = 460 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	910
Ramp Volume, V_R	90
Freeway Free-Flow Speed, S_{FF}	73.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	910	0.96	Level	33	0	0.858	0.95	1162
Ramp	90	0.96	Rolling	0	0	1.000	0.95	99
UpStream	460	0.96	Rolling	8	0	0.893	0.95	565
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1162 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1261	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1261	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 9.7 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.247 (Exibit 13-11)

S_R = 65.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 65.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2194 ft

V_u = 1100 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	1660
Ramp Volume, V_R	40
Freeway Free-Flow Speed, S_{FF}	73.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1660	0.96	Level	33	0	0.858	0.95	2121
Ramp	40	0.96	Rolling	10	0	0.870	0.95	50
UpStream	1100	0.96	Rolling	1	0	0.985	0.95	1224
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2121 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2171	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2171	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 16.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R = 65.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 65.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST. ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway/Ramp Inputs		Downstream Adj Ramp	
☐ Yes	☐ On	Freeway Number of Lanes, N	2	☑ Yes	☐ On
☑ No	☐ Off	Ramp Number of Lanes, N	1	☐ No	☑ Off
L_{up} =	ft	Acceleration Lane Length, L_A	826	L_{down} =	6630 ft
V_u =	veh/h	Deceleration Lane Length L_D		V_D =	700 veh/h
		Freeway Volume, V_F	1720		
		Ramp Volume, V_R	250		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1720	0.96	Level	18	0	0.917	0.95	2056
Ramp	250	0.96	Level	3	0	0.985	0.95	278
UpStream								
DownStream	700	0.96	Level	6	0	0.971	0.95	791

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2056 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2334	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2334	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 18.4 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.279 (Exibit 13-11)

S_R = 63.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 63.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2194 ft

V_u = 1100 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	1660
Ramp Volume, V_R	40
Freeway Free-Flow Speed, S_{FF}	73.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1660	0.96	Level	33	0	0.858	0.95	2121
Ramp	40	0.96	Rolling	10	0	0.870	0.95	50
UpStream	1100	0.96	Rolling	1	0	0.985	0.95	1224
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2121 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2171	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2171	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 16.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R = 65.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 65.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	826	☑ No	☐ Off
L_{up} =	5145 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	400 veh/h	Freeway Volume, V_F	1720	V_D =	veh/h
		Ramp Volume, V_R	250		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1720	0.96	Level	18	0	0.917	0.95	2056
Ramp	250	0.96	Level	3	0	0.985	0.95	278
UpStream	400	0.96	Level	6	0	0.971	0.95	452
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2056 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2334	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2334	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 18.4 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.279 (Exibit 13-11)

S_R = 63.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 63.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 5145 ft

V_u = 450 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	826
Deceleration Lane Length L_D	
Freeway Volume, V_F	3660
Ramp Volume, V_R	500
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3660	0.96	Level	17	0	0.922	0.95	4354
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream	450	0.96	Level	3	0	0.985	0.95	501
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 4354 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4910	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4910	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 38.3 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 0.767 (Exibit 13-11)

S_R = 48.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 48.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	910
Deceleration Lane Length L_D	
Freeway Volume, V_F	1270
Ramp Volume, V_R	100
Freeway Free-Flow Speed, S_{FF}	72.2
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 9999 ft

V_D = 460 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1270	0.96	Rolling	25	0	0.727	0.95	1915
Ramp	100	0.96	Rolling	0	0	1.000	0.95	110
UpStream								
DownStream	460	0.96	Rolling	8	0	0.893	0.95	565

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1915 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2025	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2025	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.260 (Exibit 13-11)

S_R = 64.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 910	L_{down} = 9999 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 1100 veh/h
	Freeway Volume, V_F: 2360	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 72.2	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2360	0.96	Rolling	22	0	0.752	0.95	3442
Ramp	400	0.96	Rolling	1	0	0.985	0.95	445
UpStream								
DownStream	1100	0.96	Rolling	1	0	0.985	0.95	1224

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3442 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3887	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3887	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.420 (Exibit 13-11)

S_R = 59.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 1919 ft

V_u = 700 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	910
Deceleration Lane Length L_D	
Freeway Volume, V_F	1270
Ramp Volume, V_R	100
Freeway Free-Flow Speed, S_{FF}	72.2
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1270	0.96	Rolling	25	0	0.727	0.95	1915
Ramp	100	0.96	Rolling	0	0	1.000	0.95	110
UpStream	700	0.96	Level	6	0	0.971	0.95	791
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1915 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2025	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2025	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.260 (Exibit 13-11)

S_R = 64.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/23/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 1919 ft	Acceleration Lane Length, L_A: 910	L_{down} = ft
V_u = 1800 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2360	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 72.2	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2360	0.96	Rolling	22	0	0.752	0.95	3442
Ramp	400	0.96	Rolling	1	0	0.985	0.95	445
UpStream	1800	0.96	Level	2	0	0.990	0.95	1993
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3442 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3887	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3887	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.420 (Exibit 13-11)

S_R = 59.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	0	400	250	0	0	150	0	0	220	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	6	6	6	5	5	5	5	5	5
Mvmt Flow	0	0	0	417	260	0	0	156	0	0	229	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1208	1094	0	1172	1094	260
Stage 1	-	-	-	0	0	-	1094	1094	-
Stage 2	-	-	-	1208	1094	-	78	0	-
Critical Hdwy	-	-	-	6.45	6.55	-	6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	5.45	5.55	-	-	-	-
Follow-up Hdwy	-	-	-	3.545	4.045	-	3.545	4.045	3.345
Pot Cap-1 Maneuver	-	-	-	199	211	-	210	~ 211	771
Stage 1	-	-	-	-	-	-	317	286	-
Stage 2	-	-	-	279	286	-	-	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	199	0	-	210	0	771
Mov Cap-2 Maneuver	-	-	-	199	0	-	210	0	-
Stage 1	-	-	-	-	0	-	317	0	-
Stage 2	-	-	-	279	0	-	-	0	-

Approach	WB	NE	SW
HCM Control Delay, s			
HCM LOS		-	-

Minor Lane/Major Mvmt	NELn1	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*AM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

East/West Street: *WB Exit Ramp/N. Frontage Rd.* North/South Street: *Highway 229*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)				*400*	*250*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*416*	*260*	*0*
Percent Heavy Vehicles	*0*	--	--	*6*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration				*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)		*150*			*220*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*1.00*	*1.00*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*156*	*0*	*0*	*229*	*0*
Percent Heavy Vehicles	*0*	*5*	*0*	*0*	*5*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*T*			*T*	
v (veh/h)		*416*		*156*			*229*	
C (m) (veh/h)		*1597*		*147*			*147*	
v/c		*0.26*		*1.06*			*1.56*	
95% queue length		*1.05*		*8.23*			*15.71*	
Control Delay (s/veh)		*8.0*		*152.3*			*336.4*	
LOS		*A*		*F*			*F*	
Approach Delay (s/veh)	--	--	*152.3*			*336.4*		
Approach LOS	--	--	*F*			*F*		

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Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	0	850	750	0	0	300	0	0	400	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	2	2	2	5	5	5	5	5	5
Mvmt Flow	0	0	0	885	781	0	0	312	0	0	417	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	2760	2552	0	2708	2552	781
Stage 1	-	-	-	0	0	-	2552	2552	-
Stage 2	-	-	-	2760	2552	-	156	0	-
Critical Hdwy	-	-	-	6.45	6.55	-	6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	5.45	5.55	-	-	-	-
Follow-up Hdwy	-	-	-	3.545	4.045	-	3.545	4.045	3.345
Pot Cap-1 Maneuver	-	-	-	21	~ 26	-	23	~ 26	390
Stage 1	-	-	-	-	-	-	58	~ 53	-
Stage 2	-	-	-	45	~ 53	-	-	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	21	0	-	23	0	390
Mov Cap-2 Maneuver	-	-	-	21	0	-	23	0	-
Stage 1	-	-	-	-	0	-	58	0	-
Stage 2	-	-	-	45	0	-	-	0	-

Approach	WB	NE	SW
HCM Control Delay, s			
HCM LOS		-	-

Minor Lane/Major Mvmt	NELn1	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*PM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

East/West Street: *WB Exit Ramp/N. Frontage Rd.* North/South Street: *Highway 229*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)				*850*	*750*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*885*	*781*	*0*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration				*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)		*300*			*400*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*1.00*	*1.00*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*312*	*0*	*0*	*416*	*0*
Percent Heavy Vehicles	*0*	*5*	*0*	*0*	*5*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*T*			*T*	
v (veh/h)		*885*		*312*			*416*	
C (m) (veh/h)		*1623*		*0*			*0*	
v/c		*0.55*						
95% queue length		*3.47*						
Control Delay (s/veh)		*9.8*						
LOS		*A*		*F*			*F*	
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

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Intersection	
Int Delay, s/veh	52.1

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	200	0	0	1000	500	70
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	208	0	0	1042	521	73

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1599	557	594	0	-	0
Stage 1	557	-	-	-	-	-
Stage 2	1042	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.15	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.245	-	-	-
Pot Cap-1 Maneuver	~ 115	524	968	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	335	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 115	524	968	-	-	-
Mov Cap-2 Maneuver	~ 115	-	-	-	-	-
Stage 1	568	-	-	-	-	-
Stage 2	335	-	-	-	-	-

Approach	EB	NE	SW
HCM Control Delay, s	$ 461.5	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NEL	NET	EBLn1	SWT	SWR
Capacity (veh/h)	968	-	115	-	-
HCM Lane V/C Ratio	-	-	1.812	-	-
HCM Control Delay (s)	0	-	$ 461.5	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	16.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	420.4

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	400	0	0	750	1100	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	417	0	0	781	1146	104

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1979	1198	1250	0	-	0
Stage 1	1198	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.15	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.245	-	-	-
Pot Cap-1 Maneuver	~ 67	223	547	-	-	-
Stage 1	~ 282	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 67	223	547	-	-	-
Mov Cap-2 Maneuver	~ 67	-	-	-	-	-
Stage 1	~ 282	-	-	-	-	-
Stage 2	446	-	-	-	-	-

Approach	EB	NE	SW
HCM Control Delay, s	$ 2469.6	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NEL	NET	EBLn1	SWT	SWR
Capacity (veh/h)	547	-	67	-	-
HCM Lane V/C Ratio	-	-	6.219	-	-
HCM Control Delay (s)	0	-	$ 2469.6	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	47	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	7.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	133	346	404	0	0	252
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	139	360	421	0	0	262

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	684	421	0	0	421	0
Stage 1	421	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	410	626	-	-	1122	-
Stage 1	656	-	-	-	-	-
Stage 2	774	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	410	626	-	-	1122	-
Mov Cap-2 Maneuver	410	-	-	-	-	-
Stage 1	656	-	-	-	-	-
Stage 2	774	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	410	626	1122	-
HCM Lane V/C Ratio	-	-	0.338	0.576	-	-
HCM Control Delay (s)	-	-	18.2	18.3	0	-
HCM Lane LOS	-	-	C	C	A	-
HCM 95th %tile Q(veh)	-	-	1.5	3.7	0	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	SBL	SBR	NEL	NER
Vol, veh/h	237	64	147	15	10	740
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	0	75	50	0
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	247	67	153	16	10	771

Major/Minor	Major2		Minor2		Major1	
Conflicting Flow All	0	-	0	0	0	0
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	SB	NE
HCM Control Delay, s			
HCM LOS		-	

Minor Lane/Major Mvmt	NEL	NER	WBL	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	8	59	89	20	187	3	48	13	13	5	53	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	8	61	93	21	195	3	50	14	14	5	55	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	198	0	0	154	0	0	396	364	108	376	409	196
Stage 1	-	-	-	-	-	-	124	124	-	238	238	-
Stage 2	-	-	-	-	-	-	272	240	-	138	171	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1357	-	-	1408	-	-	559	559	938	576	527	838
Stage 1	-	-	-	-	-	-	873	788	-	759	703	-
Stage 2	-	-	-	-	-	-	727	701	-	858	752	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1357	-	-	1408	-	-	496	546	938	547	514	838
Mov Cap-2 Maneuver	-	-	-	-	-	-	496	546	-	547	514	-
Stage 1	-	-	-	-	-	-	867	782	-	754	691	-
Stage 2	-	-	-	-	-	-	647	689	-	825	747	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.7	12.6	12.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	550	1357	-	-	1408	-	-	556
HCM Lane V/C Ratio	0.14	0.006	-	-	0.015	-	-	0.133
HCM Control Delay (s)	12.6	7.7	0	-	7.6	0	-	12.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.5	0	-	-	0	-	-	0.5

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	0	77	0	0	402	210
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	80	0	0	419	219

Major/Minor	Minor2		Major2	
Conflicting Flow All	528	318	-	0
Stage 1	528	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.6	7	-	-
Critical Hdwy Stg 1	6.6	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.55	3.35	-	-
Pot Cap-1 Maneuver	427	669	-	-
Stage 1	494	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	427	669	-	-
Mov Cap-2 Maneuver	427	-	-	-
Stage 1	494	-	-	-
Stage 2	-	-	-	-

Approach	EB	SW
HCM Control Delay, s	11.1	0
HCM LOS	B	

Minor Lane/Major Mvmt	EBLn1	SWT	SWR
Capacity (veh/h)	669	-	-
HCM Lane V/C Ratio	0.12	-	-
HCM Control Delay (s)	11.1	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-

Intersection	
Int Delay, s/veh	2.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	357	530	75	237	269	43	0	208	0	0	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	65	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	372	552	78	247	280	45	0	217	0	0	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	527	0	0	372	0	0	926	1055	372	915	915	387
Stage 1	-	-	-	-	-	-	372	372	-	543	543	-
Stage 2	-	-	-	-	-	-	554	683	-	372	372	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1025	-	-	1170	-	-	246	223	667	250	270	654
Stage 1	-	-	-	-	-	-	642	614	-	519	515	-
Stage 2	-	-	-	-	-	-	511	445	-	642	614	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1025	-	-	1170	-	-	226	208	667	160	252	654
Mov Cap-2 Maneuver	-	-	-	-	-	-	226	208	-	160	252	-
Stage 1	-	-	-	-	-	-	642	614	-	519	481	-
Stage 2	-	-	-	-	-	-	461	415	-	433	614	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	1.1	15	10.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	226	667	1170	-	-	1025	-	-	654
HCM Lane V/C Ratio	0.198	0.325	0.067	-	-	-	-	-	0.033
HCM Control Delay (s)	24.8	13	8.3	-	-	0	-	-	10.7
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.7	1.4	0.2	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	7.2

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	2	267	633	21	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	2	278	659	22	0	21

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	691	670	0	0	681	0
Stage 1	670	-	-	-	-	-
Stage 2	21	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	406	452	-	-	898	-
Stage 1	503	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	406	452	-	-	898	-
Mov Cap-2 Maneuver	406	-	-	-	-	-
Stage 1	503	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	25.1	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	452	898	-
HCM Lane V/C Ratio	-	-	0.62	-	-
HCM Control Delay (s)	-	-	25.1	0	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	4.1	0	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Vol, veh/h	175	250	1	21	126	479
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	182	260	1	22	131	499

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	182	0	206	182
Stage 1	-	-	-	-	182	-
Stage 2	-	-	-	-	24	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1375	-	776	853
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	991	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1375	-	775	853
Mov Cap-2 Maneuver	-	-	-	-	775	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	990	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0.3	12.9
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1077	-	-	1375	-
HCM Lane V/C Ratio	0.585	-	-	0.001	-
HCM Control Delay (s)	12.9	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	4	-	-	0	-

Intersection	
Int Delay, s/veh	2.2

Movement	WBL	WBR	NET	NER	SWL	SWT
Vol, veh/h	20	80	800	100	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	8	8	5	5	5
Mvmt Flow	21	83	833	104	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	885	885	0	0
Stage 1	885	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	6.28	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	3.372	-	-
Pot Cap-1 Maneuver	262	335	-	-
Stage 1	335	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	262	335	-	-
Mov Cap-2 Maneuver	262	-	-	-
Stage 1	335	-	-	-
Stage 2	-	-	-	-

Approach	WB	NE
HCM Control Delay, s	21.8	0
HCM LOS	C	

Minor Lane/Major Mvmt	NET	NERWBLn1
Capacity (veh/h)	-	- 317
HCM Lane V/C Ratio	-	- 0.329
HCM Control Delay (s)	-	- 21.8
HCM Lane LOS	-	- C
HCM 95th %tile Q(veh)	-	- 1.4

Intersection	
Int Delay, s/veh	6.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	146	328	206	0	0	337
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	152	342	215	0	0	351

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	566	215	0	0	215	0
Stage 1	215	-	-	-	-	-
Stage 2	351	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	481	817	-	-	1337	-
Stage 1	814	-	-	-	-	-
Stage 2	706	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	481	817	-	-	1337	-
Mov Cap-2 Maneuver	481	-	-	-	-	-
Stage 1	814	-	-	-	-	-
Stage 2	706	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	481	817	1337	-
HCM Lane V/C Ratio	-	-	0.316	0.418	-	-
HCM Control Delay (s)	-	-	15.9	12.5	0	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.3	2.1	0	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	SBL	SBR	NEL	NER
Vol, veh/h	325	89	152	12	4	530
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	0	75	50	0
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	339	93	158	12	4	552

Major/Minor	Major2		Minor2		Major1	
Conflicting Flow All	0	-	0	0	0	0
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	SB	NE
HCM Control Delay, s			
HCM LOS		-	

Minor Lane/Major Mvmt	NEL	NER	WBL	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	50	101	33	112	7	48	26	19	3	30	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	16	52	105	34	117	7	50	27	20	3	31	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	124	0	0	157	0	0	344	329	105	348	378	120
Stage 1	-	-	-	-	-	-	136	136	-	189	189	-
Stage 2	-	-	-	-	-	-	208	193	-	159	189	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1444	-	-	1405	-	-	605	585	941	601	549	923
Stage 1	-	-	-	-	-	-	860	778	-	806	738	-
Stage 2	-	-	-	-	-	-	787	735	-	836	738	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1444	-	-	1405	-	-	557	563	941	551	528	923
Mov Cap-2 Maneuver	-	-	-	-	-	-	557	563	-	551	528	-
Stage 1	-	-	-	-	-	-	850	769	-	796	719	-
Stage 2	-	-	-	-	-	-	728	716	-	780	729	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	12	11.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	610	1444	-	-	1405	-	-	567
HCM Lane V/C Ratio	0.159	0.011	-	-	0.024	-	-	0.072
HCM Control Delay (s)	12	7.5	0	-	7.6	0	-	11.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	0	72	0	0	402	152
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	75	0	0	419	158

Major/Minor	Minor2		Major2	
Conflicting Flow All	498	288	-	0
Stage 1	498	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.6	7	-	-
Critical Hdwy Stg 1	6.6	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.55	3.35	-	-
Pot Cap-1 Maneuver	449	700	-	-
Stage 1	515	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	449	700	-	-
Mov Cap-2 Maneuver	449	-	-	-
Stage 1	515	-	-	-
Stage 2	-	-	-	-

Approach	EB	SW
HCM Control Delay, s	10.8	0
HCM LOS	B	

Minor Lane/Major Mvmt	EBLn1	SWT	SWR
Capacity (veh/h)	700	-	-
HCM Lane V/C Ratio	0.107	-	-
HCM Control Delay (s)	10.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	311	371	43	321	261	51	0	142	0	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	65	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	324	386	45	334	272	53	0	148	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	606	0	0	324	0	0	906	1020	324	884	884	470
Stage 1	-	-	-	-	-	-	324	324	-	560	560	-
Stage 2	-	-	-	-	-	-	582	696	-	324	324	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	958	-	-	1219	-	-	254	234	710	263	281	587
Stage 1	-	-	-	-	-	-	682	644	-	508	506	-
Stage 2	-	-	-	-	-	-	494	439	-	682	644	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	958	-	-	1219	-	-	228	225	710	202	271	587
Mov Cap-2 Maneuver	-	-	-	-	-	-	228	225	-	202	271	-
Stage 1	-	-	-	-	-	-	682	644	-	508	487	-
Stage 2	-	-	-	-	-	-	440	423	-	540	644	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.6	15.1	11.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	228	710	1219	-	-	958	-	-	587
HCM Lane V/C Ratio	0.233	0.208	0.037	-	-	-	-	-	0.075
HCM Control Delay (s)	25.5	11.4	8.1	-	-	0	-	-	11.6
HCM Lane LOS	D	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.9	0.8	0.1	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	5.6

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	5	256	419	42	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	5	267	436	44	0	21

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	479	458	0	0	480	0
Stage 1	458	-	-	-	-	-
Stage 2	21	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	540	597	-	-	1067	-
Stage 1	631	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	540	597	-	-	1067	-
Mov Cap-2 Maneuver	540	-	-	-	-	-
Stage 1	631	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	16	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	596	1067	-
HCM Lane V/C Ratio	-	-	0.456	-	-
HCM Control Delay (s)	-	-	16	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	2.4	0	-

Intersection	
Int Delay, s/veh	4.9

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Vol, veh/h	173	191	2	23	126	288
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	180	199	2	24	131	300

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	180	0	208	180
Stage 1	-	-	-	-	180	-
Stage 2	-	-	-	-	28	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1378	-	774	855
Stage 1	-	-	-	-	844	-
Stage 2	-	-	-	-	987	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1378	-	773	855
Mov Cap-2 Maneuver	-	-	-	-	773	-
Stage 1	-	-	-	-	844	-
Stage 2	-	-	-	-	986	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0.6	9.5
HCM LOS			A

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1229	-	-	1378	-
HCM Lane V/C Ratio	0.351	-	-	0.002	-
HCM Control Delay (s)	9.5	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	1.6	-	-	0	-

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NET	NER	SWL	SWT
Vol, veh/h	20	60	615	60	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	5	5
Mvmt Flow	21	62	641	62	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	672	672	0	0
Stage 1	672	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	6.23	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	3.327	-	-
Pot Cap-1 Maneuver	365	454	-	-
Stage 1	440	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	365	454	-	-
Mov Cap-2 Maneuver	365	-	-	-
Stage 1	440	-	-	-
Stage 2	-	-	-	-

Approach	WB	NE
HCM Control Delay, s	15.4	0
HCM LOS	C	

Minor Lane/Major Mvmt	NET	NER	WBLn1
Capacity (veh/h)	-	-	428
HCM Lane V/C Ratio	-	-	0.195
HCM Control Delay (s)	-	-	15.4
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	0.7

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*AM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

East/West Street: *W. South St.* North/South Street: *Bell St.*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*10*	*740*			*237*	*64*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*10*	*770*	*0*	*0*	*246*	*66*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*147*		*15*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*153*	*0*	*15*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (veh/h)	*10*					*153*		*15*
C (m) (veh/h)	*1303*					*251*		*785*
v/c	*0.01*					*0.61*		*0.02*
95% queue length	*0.02*					*3.62*		*0.06*
Control Delay (s/veh)	*7.8*					*39.4*		*9.7*
LOS	*A*					*E*		*A*
Approach Delay (s/veh)	--	--				*36.8*		
Approach LOS	--	--				*E*		

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Mathew Trippett*	Intersection	
Agency/Co.	*Bridgefarmer & Associates*	Jurisdiction	*Benton, AR*
Date Performed	*2/10/2015*	Analysis Year	*2018*
Analysis Time Period	*PM*		

Project Description *CA0601*

East/West Street: *W. South St.* North/South Street: *Bell St.*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*4*	*530*			*325*	*89*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*4*	*552*	*0*	*0*	*338*	*92*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*152*		*12*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.92*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*158*	*0*	*12*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (veh/h)	*4*					*158*		*12*
C (m) (veh/h)	*1205*					*305*		*697*
v/c	*0.00*					*0.52*		*0.02*
95% queue length	*0.01*					*2.80*		*0.05*
Control Delay (s/veh)	*8.0*					*28.8*		*10.3*
LOS	*A*					*D*		*B*
Approach Delay (s/veh)	--	--				*27.5*		
Approach LOS	--	--				*D*		

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3150*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1882*	pc/h/ln
S	*64.6*	mph
D = v_p / S	*29.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2770*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*29*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.873*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1739*	pc/h/ln
S	*66.6*	mph
D = v_p / S	*26.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2082*	pc/h/ln
S	*62.0*	mph
D = v_p / S	*33.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3520*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*28*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.877*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2200*	pc/h/ln
S	*59.1*	mph
D = v_p / S	*37.3*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1711*	pc/h/ln
S	*67.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3840*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*23*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.897*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1565*	pc/h/ln
S	*68.5*	mph
D = v_p / S	*22.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SEVIER ST LANE ADD.*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2111*	pc/h/ln
S	*60.4*	mph
D = v_p / S	*35.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SEVIER ST LANE ADD.*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4940*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1968*	pc/h/ln
S	*63.2*	mph
D = v_p / S	*31.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1239*	pc/h/ln
S	*74.4*	mph
D = v_p / S	*16.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON RAMP*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2270*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1487*	pc/h/ln
S	*72.4*	mph
D = v_p / S	*20.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2935*	pc/h/ln
S	*35.1*	mph
D = v_p / S	*83.7*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4470*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2720*	pc/h/ln
S	*43.2*	mph
D = v_p / S	*63.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2070*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1282*	pc/h/ln
S	*74.1*	mph
D = v_p / S	*17.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2470*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1618*	pc/h/ln
S	*70.8*	mph
D = v_p / S	*22.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4450*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2549*	pc/h/ln
S	*48.9*	mph
D = v_p / S	*52.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4020*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*21*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.905*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2435*	pc/h/ln
S	*52.3*	mph
D = v_p / S	*46.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	162
Freeway Volume, V_F	3500
Ramp Volume, V_R	350
Freeway Free-Flow Speed, S_{FF}	72.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 3075 ft
V_D = 1900 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3500	0.96	Level	17	0	0.922	0.95	4164
Ramp	350	0.96	Level	0	0	1.000	0.95	384
UpStream								
DownStream	1900	0.96	Rolling	1	0	0.985	0.95	2115

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 4164 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4164	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3780	Exhibit 13-8	4800	No
V_R	384	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4164	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 38.6 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.268 (Exhibit 13-12)
S_R= 64.4 mph (Exhibit 13-12)
S_0= N/A mph (Exhibit 13-12)
S = 64.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	162	L_{down} =	3075 ft
V_u =	veh/h	Freeway Volume, V_F	3520	V_D =	1700 veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3520	0.96	Level	28	0	0.877	0.95	4400
Ramp	750	0.96	Level	2	0	0.990	0.95	831
UpStream								
DownStream	1700	0.96	Rolling	3	0	0.957	0.95	1948

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4400 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4400	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3569	Exhibit 13-8	4800	No
V_R	831	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4400	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 40.6 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.308 (Exhibit 13-12)

S_R= 63.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9825 ft	Deceleration Lane Length L_D	162	L_{down} =	ft
V_u =	1500 veh/h	Freeway Volume, V_F	3500	V_D =	veh/h
		Ramp Volume, V_R	350		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3500	0.96	Level	17	0	0.922	0.95	4164
Ramp	350	0.96	Level	0	0	1.000	0.95	384
UpStream	1500	0.96	Level	3	0	0.985	0.95	1669
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4164 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4164	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3780	Exhibit 13-8	4800	No
V_R	384	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4164	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 38.6 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.268 (Exhibit 13-12)

S_R= 64.4 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 64.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9825 ft	Deceleration Lane Length L_D	162	L_{down} =	ft
V_u =	1250 veh/h	Freeway Volume, V_F	3520	V_D =	veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3520	0.96	Level	28	0	0.877	0.95	4400
Ramp	750	0.96	Level	2	0	0.990	0.95	831
UpStream	1250	0.96	Level	5	0	0.976	0.95	1405
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4400 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4400	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	3569	Exhibit 13-8	4800	No
V_R	831	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4400	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 40.6 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.308 (Exhibit 13-12)

S_R= 63.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 63.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	157	L_{down} =	2171 ft
V_u =	veh/h	Freeway Volume, V_F	2070	V_D =	1500 veh/h
		Ramp Volume, V_R	70		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2070	0.96	Level	26	0	0.885	0.95	2565
Ramp	70	0.96	Rolling	0	0	1.000	0.95	77
UpStream								
DownStream	1500	0.96	Level	3	0	0.985	0.95	1669

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2565 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2565	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2488	Exhibit 13-8	4800	No
V_R	77	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2565	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.500 (Exhibit 13-12)

S_R= 57.8 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.8 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 2171 ft
V_u = veh/h	Deceleration Lane Length L_D: 157	V_D = 1250 veh/h
	Freeway Volume, V_F: 2470	
	Ramp Volume, V_R: 200	
	Freeway Free-Flow Speed, S_{FF}: 73.6	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2470	0.96	Level	39	0	0.837	0.95	3236
Ramp	200	0.96	Rolling	22	0	0.752	0.95	292
UpStream								
DownStream	1250	0.96	Level	5	0	0.976	0.95	1405

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3236 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3236	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2944	Exhibit 13-8	4800	No
V_R	292	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3236	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.7 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.519 (Exhibit 13-12)

S_R= 57.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2180 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	920 veh/h	Freeway Volume, V_F	4940	V_D =	veh/h
		Ramp Volume, V_R	1100		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4940	0.96	Level	18	0	0.917	0.95	5904
Ramp	1100	0.96	Level	1	0	0.995	0.95	1212
UpStream	920	0.96	Level	3	0	0.985	0.95	1024
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8929.19 (Equation 13-12 or 13-13)

P_{FD} = 0.557 using Equation (Exhibit 13-7)

V_{12} = 3824 pc/h

V_3 or V_{av34} 2080 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5904	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4692	Exhibit 13-8	7200	No
V_R	1212	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3824	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 35.4 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.342 (Exhibit 13-12)

S_R= 61.5 mph (Exhibit 13-12)

S_0= 74.4 mph (Exhibit 13-12)

S = 65.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2180 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	1050 veh/h	Freeway Volume, V_F	5500	V_D =	veh/h
		Ramp Volume, V_R	1000		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5500	0.96	Level	10	0	0.952	0.95	6332
Ramp	1000	0.96	Level	1	0	0.995	0.95	1102
UpStream	1050	0.96	Level	8	0	0.962	0.95	1197
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 9007.86 (Equation 13-12 or 13-13)

P_{FD} = 0.551 using Equation (Exhibit 13-7)

V_{12} = 3984 pc/h

V_3 or V_{av34} 2348 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6332	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	5230	Exhibit 13-8	7200	No
V_R	1102	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3984	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 36.8 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.332 (Exhibit 13-12)

S_R= 61.8 mph (Exhibit 13-12)

S_0= 73.4 mph (Exhibit 13-12)

S = 65.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5160 ft
V_u = veh/h	Deceleration Lane Length L_D: 558	V_D = 1050 veh/h
	Freeway Volume, V_F: 5050	
	Ramp Volume, V_R: 600	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5050	0.96	Level	12	0	0.943	0.95	5870
Ramp	600	0.96	Level	38	0	0.840	0.95	783
UpStream								
DownStream	1050	0.96	Level	8	0	0.962	0.95	1197

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5870 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5870	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	5087	Exhibit 13-8	4800	Yes
V_R	783	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5870	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 49.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.563 (Exhibit 13-12)

S_R= 55.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6700 ft	Deceleration Lane Length L_D	558	L_{down} =	ft
V_u =	1900 veh/h	Freeway Volume, V_F	5050	V_D =	veh/h
		Ramp Volume, V_R	600		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5050	0.96	Level	12	0	0.943	0.95	5870
Ramp	600	0.96	Level	38	0	0.840	0.95	783
UpStream	1900	0.96	Rolling	1	0	0.985	0.95	2115
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5870 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5870	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	5087	Exhibit 13-8	4800	Yes
V_R	783	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5870	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 49.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.563 (Exhibit 13-12)

S_R= 55.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5160 ft
V_u = veh/h	Deceleration Lane Length L_D: 558	V_D = 920 veh/h
	Freeway Volume, V_F: 4470	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4470	0.96	Level	22	0	0.901	0.95	5440
Ramp	450	0.96	Level	36	0	0.847	0.95	582
UpStream								
DownStream	920	0.96	Level	3	0	0.985	0.95	1024

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5440 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5440	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	4858	Exhibit 13-8	4800	Yes
V_R	582	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5440	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 46.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.545 (Exhibit 13-12)

S_R= 55.5 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6700 ft	Deceleration Lane Length L_D	558	L_{down} =	ft
V_u =	1700 veh/h	Freeway Volume, V_F	4470	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4470	0.96	Level	22	0	0.901	0.95	5440
Ramp	450	0.96	Level	36	0	0.847	0.95	582
UpStream	1700	0.96	Rolling	3	0	0.957	0.95	1948
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5440 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5440	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	4858	Exhibit 13-8	4800	Yes
V_R	582	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5440	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 46.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.545 (Exhibit 13-12)

S_R= 55.5 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 55.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 580	L_{down} = 6700 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 600 veh/h
	Freeway Volume, V_F: 3150	
	Ramp Volume, V_R: 1900	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3150	0.96	Level	18	0	0.917	0.95	3765
Ramp	1900	0.96	Rolling	1	0	0.985	0.95	2115
UpStream								
DownStream	600	0.96	Level	38	0	0.840	0.95	783

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3765 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5880	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5880	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 46.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.658 (Exibit 13-11)

S_R = 22.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 22.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 580	L_{down} = 6700 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 450 veh/h
	Freeway Volume, V_F: 2770	
	Ramp Volume, V_R: 1700	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2770	0.96	Level	29	0	0.873	0.95	3478
Ramp	1700	0.96	Rolling	3	0	0.957	0.95	1948
UpStream								
DownStream	450	0.96	Level	36	0	0.847	0.95	582

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3478 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5426	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5426	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 43.3 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.149 (Exibit 13-11)

S_R = 37.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 37.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 3075 ft

V_u = 350 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	580
Deceleration Lane Length L_D	
Freeway Volume, V_F	3150
Ramp Volume, V_R	1900
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3150	0.96	Level	18	0	0.917	0.95	3765
Ramp	1900	0.96	Rolling	1	0	0.985	0.95	2115
UpStream	350	0.96	Level	0	0	1.000	0.95	384
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3765 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5880	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5880	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 46.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.658 (Exibit 13-11)

S_R = 22.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 22.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 3075 ft	Acceleration Lane Length, L_A: 580	L_{down} = ft
V_u = 750 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2770	
	Ramp Volume, V_R: 1700	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2770	0.96	Level	29	0	0.873	0.95	3478
Ramp	1700	0.96	Rolling	3	0	0.957	0.95	1948
UpStream	750	0.96	Level	2	0	0.990	0.95	831
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3478 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5426	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5426	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 43.3 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.149 (Exibit 13-11)

S_R = 37.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 37.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 795	L_{down} = 9825 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 350 veh/h
	Freeway Volume, V_F: 2000	
	Ramp Volume, V_R: 1500	
	Freeway Free-Flow Speed, S_{FF}: 73.1	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2000	0.96	Level	26	0	0.885	0.95	2478
Ramp	1500	0.96	Level	3	0	0.985	0.95	1669
UpStream								
DownStream	350	0.96	Level	0	0	1.000	0.95	384

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2478 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4147	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4147	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.488 (Exibit 13-11)

S_R = 57.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 57.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	795
Deceleration Lane Length L_D	
Freeway Volume, V_F	2270
Ramp Volume, V_R	1250
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 9825 ft

V_D = 750 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2270	0.96	Level	39	0	0.837	0.95	2974
Ramp	1250	0.96	Level	5	0	0.976	0.95	1405
UpStream								
DownStream	750	0.96	Level	2	0	0.990	0.95	831

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2974 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4379	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4379	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 34.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.553 (Exibit 13-11)

S_R = 55.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 55.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2171 ft

V_u = 70 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	795
Deceleration Lane Length L_D	
Freeway Volume, V_F	2000
Ramp Volume, V_R	1500
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2000	0.96	Level	26	0	0.885	0.95	2478
Ramp	1500	0.96	Level	3	0	0.985	0.95	1669
UpStream	70	0.96	Rolling	0	0	1.000	0.95	77
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2478 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4147	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4147	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.488 (Exibit 13-11)

S_R = 57.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 57.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2171 ft

V_u = 200 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	795
Deceleration Lane Length L_D	
Freeway Volume, V_F	2270
Ramp Volume, V_R	1250
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2270	0.96	Level	39	0	0.837	0.95	2974
Ramp	1250	0.96	Level	5	0	0.976	0.95	1405
UpStream	200	0.96	Rolling	22	0	0.752	0.95	292
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2974 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4379	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4379	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 34.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.553 (Exibit 13-11)

S_R = 55.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 55.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*25*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.727*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1545*	pc/h/ln
S	*68.6*	mph
D = v_p / S	*22.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3650*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2661*	pc/h/ln
S	*45.2*	mph
D = v_p / S	*58.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*958*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*12.8*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1629*	pc/h/ln
S	*70.6*	mph
D = v_p / S	*23.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2250*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.893*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1382*	pc/h/ln
S	*73.4*	mph
D = v_p / S	*18.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4350*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2647*	pc/h/ln
S	*45.0*	mph
D = v_p / S	*58.9*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (3 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1016*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (3 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5200*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2062*	pc/h/ln
S	*61.4*	mph
D = v_p / S	*33.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*16*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.926*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1776*	pc/h/ln
S	*66.2*	mph
D = v_p / S	*26.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/24/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*15*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3566*	pc/h/ln
S	*5.1*	mph
D = v_p / S	*704.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (2 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1524*	pc/h/ln
S	*68.8*	mph
D = v_p / S	*22.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTH ST (2 LANE)*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5200*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3093*	pc/h/ln
S	*28.4*	mph
D = v_p / S	*108.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1600*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*32*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1018*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*13.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2600*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1661*	pc/h/ln
S	*70.2*	mph
D = v_p / S	*23.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*19*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.913*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1021*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/24/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4950*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1963*	pc/h/ln
S	*63.2*	mph
D = v_p / S	*31.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	352	L_{down} =	2194 ft
V_u =	veh/h	Freeway Volume, V_F	2250	V_D =	100 veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2250	0.96	Level	24	0	0.893	0.95	2763
Ramp	750	0.96	Rolling	8	0	0.893	0.95	921
UpStream								
DownStream	100	0.96	Rolling	0	0	1.000	0.95	110

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2763 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2763	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1842	Exhibit 13-8	4800	No
V_R	921	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2763	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.316 (Exhibit 13-12)

S_R= 62.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	352	L_{down} =	2194 ft
V_u =	veh/h	Freeway Volume, V_F	4350	V_D =	50 veh/h
		Ramp Volume, V_R	1800		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4350	0.96	Level	22	0	0.901	0.95	5294
Ramp	1800	0.96	Rolling	1	0	0.985	0.95	2003
UpStream								
DownStream	50	0.96	Rolling	10	0	0.870	0.95	63

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5294 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5294	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	3291	Exhibit 13-8	4800	No
V_R	2003	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5294	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 46.6 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.413 (Exhibit 13-12)

S_R= 60.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 60.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	352	L_{down} =	ft
V_u =	200 veh/h	Freeway Volume, V_F	2250	V_D =	veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2250	0.96	Level	24	0	0.893	0.95	2763
Ramp	750	0.96	Rolling	8	0	0.893	0.95	921
UpStream	200	0.96	Rolling	0	0	1.000	0.95	219
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2763 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2763	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1842	Exhibit 13-8	4800	No
V_R	921	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2763	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.316 (Exhibit 13-12)

S_R= 62.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp: ☑ Yes ☑ On ☐ No ☐ Off; L_{up} = 9999 ft; V_u = 700 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	352
Freeway Volume, V_F	4350
Ramp Volume, V_R	1800
Freeway Free-Flow Speed, S_{FF}	72.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp: ☐ Yes ☐ On ☑ No ☐ Off; L_{down} = ft; V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4350	0.96	Level	22	0	0.901	0.95	5294
Ramp	1800	0.96	Rolling	1	0	0.985	0.95	2003
UpStream	700	0.96	Rolling	1	0	0.985	0.95	779
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 5294 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5294	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	3291	Exhibit 13-8	4800	No
V_R	2003	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	5294	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 46.6 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.413 (Exhibit 13-12)

S_R= 60.0 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 60.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	153	L_{down} =	5145 ft
V_u =	veh/h	Freeway Volume, V_F	3000	V_D =	450 veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	450	0.96	Level	6	0	0.971	0.95	508
UpStream								
DownStream	450	0.96	Level	3	0	0.985	0.95	501

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.648 using Equation (Exhibit 13-7)

V_{12} = 2481 pc/h

V_3 or V_{av34} 1072 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3045	Exhibit 13-8	7200	No
V_R	508	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2481	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.279 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	153	L_{down} =	5145 ft
V_u =	veh/h	Freeway Volume, V_F	5700	V_D =	850 veh/h
		Ramp Volume, V_R	500		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5700	0.96	Level	15	0	0.930	0.95	6719
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream								
DownStream	850	0.96	Level	3	0	0.985	0.95	946

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.566 using Equation (Exhibit 13-7)

V_{12} = 4047 pc/h

V_3 or V_{av34} 2672 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6719	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	6163	Exhibit 13-8	7200	No
V_R	556	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4047	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 37.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.283 (Exhibit 13-12)

S_R= 63.3 mph (Exhibit 13-12)

S_0= 72.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	450 veh/h	Freeway Volume, V_F	3000	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	450	0.96	Level	6	0	0.971	0.95	508
UpStream	450	0.96	Level	1	0	0.995	0.95	496
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 4346.64 (Equation 13-12 or 13-13)

P_{FD} = 0.648 using Equation (Exhibit 13-7)

V_{12} = 2481 pc/h

V_3 or V_{av34} 1072 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3045	Exhibit 13-8	7200	No
V_R	508	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2481	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.279 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	750 veh/h	Freeway Volume, V_F	5700	V_D =	veh/h
		Ramp Volume, V_R	500		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5700	0.96	Level	15	0	0.930	0.95	6719
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream	750	0.96	Level	0	0	1.000	0.95	822
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 4484.92 (Equation 13-12 or 13-13)

P_{FD} = 0.566 using Equation (Exhibit 13-7)

V_{12} = 4047 pc/h

V_3 or V_{av34} 2672 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6719	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	6163	Exhibit 13-8	7200	No
V_R	556	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4047	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 37.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.283 (Exhibit 13-12)

S_R= 63.3 mph (Exhibit 13-12)

S_0= 72.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	103	L_{down} =	1919 ft
V_u =	veh/h	Freeway Volume, V_F	3000	V_D =	200 veh/h
		Ramp Volume, V_R	950		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	950	0.96	Level	6	0	0.971	0.95	1073
UpStream								
DownStream	200	0.96	Rolling	0	0	1.000	0.95	219

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3553 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2480	Exhibit 13-8	4800	No
V_R	1073	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3553	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.330 (Exhibit 13-12)

S_R= 62.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	103
Freeway Volume, V_F	6050
Ramp Volume, V_R	2400
Freeway Free-Flow Speed, S_{FF}	72.2
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1919 ft
V_D = 700 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6050	0.96	Level	15	0	0.930	0.95	7131
Ramp	2400	0.96	Level	2	0	0.990	0.95	2658
UpStream								
DownStream	700	0.96	Rolling	1	0	0.985	0.95	779

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 7131 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7131	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	4473	Exhibit 13-8	4800	No
V_R	2658	Exhibit 13-10	2100	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	7131	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 64.7 (pc/mi/ln)
LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.472 (Exhibit 13-12)
S_R= 57.9 mph (Exhibit 13-12)
S_0= N/A mph (Exhibit 13-12)
S = 57.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6630 ft	Deceleration Lane Length L_D	103	L_{down} =	ft
V_u =	450 veh/h	Freeway Volume, V_F	3000	V_D =	veh/h
		Ramp Volume, V_R	950		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	950	0.96	Level	6	0	0.971	0.95	1073
UpStream	450	0.96	Level	3	0	0.985	0.95	501
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3553 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2480	Exhibit 13-8	4800	No
V_R	1073	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3553	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.330 (Exhibit 13-12)

S_R= 62.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 62.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	6630 ft	Deceleration Lane Length L_D	103	L_{down} =	ft
V_u =	850 veh/h	Freeway Volume, V_F	6050	V_D =	veh/h
		Ramp Volume, V_R	2400		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6050	0.96	Level	15	0	0.930	0.95	7131
Ramp	2400	0.96	Level	2	0	0.990	0.95	2658
UpStream	850	0.96	Level	3	0	0.985	0.95	946
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 7131 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7131	Exhibit 13-8	4800	Yes
$V_{FO} = V_F - V_R$	4473	Exhibit 13-8	4800	No
V_R	2658	Exhibit 13-10	2100	Yes

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	7131	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 64.7 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

D_s = 0.472 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 986	L_{down} = 1634 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 450 veh/h
	Freeway Volume, V_F: 2550	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	19	0	0.913	0.95	3062
Ramp	450	0.96	Level	1	0	0.995	0.95	496
UpStream								
DownStream	450	0.96	Level	6	0	0.971	0.95	508

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2361.67 (Equation 13-6 or 13-7)

P_{FM} = 0.630 using Equation (Exhibit 13-6)

V_{12} = 1930 pc/h

V_3 or V_{av34} 1132 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1930 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3558	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2426	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R= 63.8 mph (Exhibit 13-11)

S_0= 69.4 mph (Exhibit 13-11)

S = 65.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 986	L_{down} = 1634 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 500 veh/h
	Freeway Volume, V_F: 4950	
	Ramp Volume, V_R: 750	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4950	0.96	Level	17	0	0.922	0.95	5889
Ramp	750	0.96	Level	0	0	1.000	0.95	822
UpStream								
DownStream	500	0.96	Level	3	0	0.985	0.95	556

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2584.82 (Equation 13-6 or 13-7)

P_{FM} = 0.638 using Equation (Exhibit 13-6)

V_{12} = 3758 pc/h

V_3 or V_{av34} 2131 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3758 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6711	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4580	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 34.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.603 (Exibit 13-11)

S_R= 53.8 mph (Exhibit 13-11)

S_0= 65.8 mph (Exhibit 13-11)

S = 57.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2194 ft

V_u = 750 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	1500
Ramp Volume, V_R	100
Freeway Free-Flow Speed, S_{FF}	73.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1500	0.96	Level	33	0	0.858	0.95	1916
Ramp	100	0.96	Rolling	0	0	1.000	0.95	110
UpStream	750	0.96	Rolling	8	0	0.893	0.95	921
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1916 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2026	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2026	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.263 (Exibit 13-11)

S_R = 65.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 65.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2194 ft

V_u = 1800 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	2550
Ramp Volume, V_R	50
Freeway Free-Flow Speed, S_{FF}	73.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	33	0	0.858	0.95	3257
Ramp	50	0.96	Rolling	10	0	0.870	0.95	63
UpStream	1800	0.96	Rolling	1	0	0.985	0.95	2003
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3257 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3320	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3320	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 25.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.341 (Exibit 13-11)

S_R = 62.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 62.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 826	L_{down} = 6630 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 950 veh/h
	Freeway Volume, V_F: 2550	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	18	0	0.917	0.95	3048
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream								
DownStream	950	0.96	Level	6	0	0.971	0.95	1073

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3048 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3549	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3549	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.374 (Exibit 13-11)

S_R = 60.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 826	L_{down} = 6630 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 2400 veh/h
	Freeway Volume, V_F: 5200	
	Ramp Volume, V_R: 850	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5200	0.96	Level	17	0	0.922	0.95	6186
Ramp	850	0.96	Level	3	0	0.985	0.95	946
UpStream								
DownStream	2400	0.96	Level	2	0	0.990	0.95	2658

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 6186 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7132	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	7132	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 55.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 5.119 (Exibit 13-11)

S_R = -80.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = -80.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 5145 ft

V_u = 450 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	826
Deceleration Lane Length L_D	
Freeway Volume, V_F	2550
Ramp Volume, V_R	450
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	18	0	0.917	0.95	3048
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream	450	0.96	Level	6	0	0.971	0.95	508
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3048 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3549	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3549	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 27.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.374 (Exibit 13-11)

S_R = 60.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 5145 ft	Acceleration Lane Length, L_A: 826	L_{down} = ft
V_u = 500 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 5200	
	Ramp Volume, V_R: 850	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5200	0.96	Level	17	0	0.922	0.95	6186
Ramp	850	0.96	Level	3	0	0.985	0.95	946
UpStream	500	0.96	Level	3	0	0.985	0.95	556
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 6186 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7132	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	7132	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 55.5 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 5.119 (Exibit 13-11)

S_R = -80.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = -80.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 910	L_{down} = 9999 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 750 veh/h
	Freeway Volume, V_F: 2050	
	Ramp Volume, V_R: 200	
	Freeway Free-Flow Speed, S_{FF}: 72.2	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2050	0.96	Rolling	25	0	0.727	0.95	3091
Ramp	200	0.96	Rolling	0	0	1.000	0.95	219
UpStream								
DownStream	750	0.96	Rolling	8	0	0.893	0.95	921

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3091 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3310	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3310	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 25.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.337 (Exibit 13-11)

S_R = 62.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 62.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 910	L_{down} = 9999 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 1800 veh/h
	Freeway Volume, V_F: 3650	
	Ramp Volume, V_R: 700	
	Freeway Free-Flow Speed, S_{FF}: 72.2	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3650	0.96	Rolling	22	0	0.752	0.95	5323
Ramp	700	0.96	Rolling	1	0	0.985	0.95	779
UpStream								
DownStream	1800	0.96	Rolling	1	0	0.985	0.95	2003

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 5323 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6102	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	6102	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 47.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.972 (Exibit 13-11)

S_R = 12.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 12.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 1919 ft

V_u = 950 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	910
Deceleration Lane Length L_D	
Freeway Volume, V_F	2050
Ramp Volume, V_R	200
Freeway Free-Flow Speed, S_{FF}	72.2
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2050	0.96	Rolling	25	0	0.727	0.95	3091
Ramp	200	0.96	Rolling	0	0	1.000	0.95	219
UpStream	950	0.96	Level	6	0	0.971	0.95	1073
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3091 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3310	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3310	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.337 (Exibit 13-11)

S_R = 62.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 62.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/24/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	910	☑ No	☐ Off
L_{up} =	1919 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	2400 veh/h	Freeway Volume, V_F	3650	V_D =	veh/h
		Ramp Volume, V_R	700		
		Freeway Free-Flow Speed, S_{FF}	72.2		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3650	0.96	Rolling	22	0	0.752	0.95	5323
Ramp	700	0.96	Rolling	1	0	0.985	0.95	779
UpStream	2400	0.96	Level	2	0	0.990	0.95	2658
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 5323 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6102	Exhibit 13-8		Yes

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	6102	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 47.0 (pc/mi/ln)

LOS = F (Exhibit 13-2)

Speed Determination

M_S = 1.972 (Exibit 13-11)

S_R = 12.6 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 12.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	0	500	350	0	0	250	0	0	300	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	6	6	6	5	5	5	5	5	5
Mvmt Flow	0	0	0	521	365	0	0	260	0	0	312	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	1563	1406	0	1536	1406	365
Stage 1	-	-	-	0	0	-	1406	1406	-
Stage 2	-	-	-	1563	1406	-	130	0	-
Critical Hdwy	-	-	-	6.45	6.55	-	6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	5.45	5.55	-	-	-	-
Follow-up Hdwy	-	-	-	3.545	4.045	-	3.545	4.045	3.345
Pot Cap-1 Maneuver	-	-	-	121	~ 137	-	126	~ 137	673
Stage 1	-	-	-	-	-	-	223	~ 203	-
Stage 2	-	-	-	187	~ 203	-	-	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	121	0	-	126	0	673
Mov Cap-2 Maneuver	-	-	-	121	0	-	126	0	-
Stage 1	-	-	-	-	0	-	223	0	-
Stage 2	-	-	-	187	0	-	-	0	-

Approach	WB	NE	SW
HCM Control Delay, s			
HCM LOS		-	-

Minor Lane/Major Mvmt	NELn1	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	*Mathew Trippett*	Intersection	
Agency/Co.	*Bridgefarmer & Associates*	Jurisdiction	*Benton, AR*
Date Performed	*2/10/2015*	Analysis Year	*2038*
Analysis Time Period	*AM*		

Project Description *CA0601*

East/West Street: *WB Exit Ramp/N. Frontage Rd.* North/South Street: *Highway 229*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)				*500*	*350*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*520*	*364*	*0*
Percent Heavy Vehicles	*0*	--	--	*6*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration				*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)		*250*			*300*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*1.00*	*1.00*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*260*	*0*	*0*	*312*	*0*
Percent Heavy Vehicles	*0*	*5*	*0*	*0*	*5*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*T*			*T*	
v (veh/h)		*520*		*260*			*312*	
C (m) (veh/h)		*1597*		*81*			*81*	
v/c		*0.33*		*3.21*			*3.85*	
95% queue length		*1.43*		*26.11*			*32.48*	
Control Delay (s/veh)		*8.3*		*1105*			*1390*	
LOS		*A*		*F*			*F*	
Approach Delay (s/veh)	--	--	*1105*			*1390*		
Approach LOS	--	--	*F*			*F*		

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Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	0	0	1000	1000	0	0	550	0	0	700	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	2	2	2	5	5	5	5	5	5
Mvmt Flow	0	0	0	1042	1042	0	0	573	0	0	729	0

Major/Minor	Major2			Minor1			Minor2		
Conflicting Flow All	0	0	0	3490	3125	0	3411	3125	1042
Stage 1	-	-	-	0	0	-	3125	3125	-
Stage 2	-	-	-	3490	3125	-	286	0	-
Critical Hdwy	-	-	-	6.45	6.55	-	6.45	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	5.45	5.55	-
Critical Hdwy Stg 2	-	-	-	5.45	5.55	-	-	-	-
Follow-up Hdwy	-	-	-	3.545	4.045	-	3.545	4.045	3.345
Pot Cap-1 Maneuver	-	-	-	7	~ 11	-	8	~ 11	275
Stage 1	-	-	-	-	-	-	29	~ 26	-
Stage 2	-	-	-	18	~ 26	-	-	-	-
Platoon blocked, %		-	-						
Mov Cap-1 Maneuver	-	-	-	7	0	-	8	0	275
Mov Cap-2 Maneuver	-	-	-	7	0	-	8	0	-
Stage 1	-	-	-	-	0	-	29	0	-
Stage 2	-	-	-	18	0	-	-	0	-

Approach	WB	NE	SW
HCM Control Delay, s			
HCM LOS		-	-

Minor Lane/Major Mvmt	NELn1	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*PM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

East/West Street: *WB Exit Ramp/N. Frontage Rd.* North/South Street: *Highway 229*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)				*1000*	*1000*	
Peak-Hour Factor, PHF	*1.00*	*1.00*	*1.00*	*0.96*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*1041*	*1041*	*0*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*1*	*0*
Configuration				*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)		*550*			*700*	
Peak-Hour Factor, PHF	*1.00*	*0.96*	*1.00*	*1.00*	*0.96*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*572*	*0*	*0*	*729*	*0*
Percent Heavy Vehicles	*0*	*5*	*0*	*0*	*5*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*T*			*T*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*		*T*			*T*	
v (veh/h)		*1041*		*572*			*729*	
C (m) (veh/h)		*1623*		*0*			*0*	
v/c		*0.64*						
95% queue length		*5.02*						
Control Delay (s/veh)		*11.1*						
LOS		*B*		*F*			*F*	
Approach Delay (s/veh)	--	--						
Approach LOS	--	--						

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Intersection	
Int Delay, s/veh	399.4

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	350	0	0	1300	710	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	365	0	0	1354	740	94

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2140	786	833	0	-	0
Stage 1	786	-	-	-	-	-
Stage 2	1354	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.15	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.245	-	-	-
Pot Cap-1 Maneuver	~ 53	387	787	-	-	-
Stage 1	444	-	-	-	-	-
Stage 2	~ 237	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 53	387	787	-	-	-
Mov Cap-2 Maneuver	~ 53	-	-	-	-	-
Stage 1	444	-	-	-	-	-
Stage 2	~ 237	-	-	-	-	-

Approach	EB	NE	SW
HCM Control Delay, s	$ 2795.7	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NEL	NET	EBLn1	SWT	SWR
Capacity (veh/h)	787	-	53	-	-
HCM Lane V/C Ratio	-	-	6.879	-	-
HCM Control Delay (s)	0	-	$ 2795.7	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	42.2	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	3895.8

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	750	0	0	1100	1550	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	781	0	0	1146	1615	156

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2839	1693	1771	0	-	0
Stage 1	1693	-	-	-	-	-
Stage 2	1146	-	-	-	-	-
Critical Hdwy	6.45	6.25	4.15	-	-	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	2.245	-	-	-
Pot Cap-1 Maneuver	~ 19	113	344	-	-	-
Stage 1	~ 161	-	-	-	-	-
Stage 2	~ 299	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 19	113	344	-	-	-
Mov Cap-2 Maneuver	~ 19	-	-	-	-	-
Stage 1	~ 161	-	-	-	-	-
Stage 2	~ 299	-	-	-	-	-

Approach	EB	NE	SW
HCM Control Delay, s	$ 18439.9	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NEL	NET	EBLn1	SWT	SWR
Capacity (veh/h)	344	-	19	-	-
HCM Lane V/C Ratio	-	-	41.118	-	-
HCM Control Delay (s)	0	-	$ 18439.9	-	-
HCM Lane LOS	A	-	F	-	-
HCM 95th %tile Q(veh)	0	-	98.3	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	20.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	179	466	545	0	0	342
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	186	485	568	0	0	356

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	924	568	0	0	568	0
Stage 1	568	-	-	-	-	-
Stage 2	356	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	295	517	-	-	989	-
Stage 1	561	-	-	-	-	-
Stage 2	702	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	295	517	-	-	989	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	561	-	-	-	-	-
Stage 2	702	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	49.1	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	295	517	989	-
HCM Lane V/C Ratio	-	-	0.632	0.939	-	-
HCM Control Delay (s)	-	-	36	54.2	0	-
HCM Lane LOS	-	-	E	F	A	-
HCM 95th %tile Q(veh)	-	-	4	11.7	0	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	SBL	SBR	NEL	NER
Vol, veh/h	322	86	199	20	13	998
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	0	75	50	0
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	335	90	207	21	14	1040

Major/Minor	Major2		Minor2		Major1	
Conflicting Flow All	0	-	0	0	0	0
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	SB	NE
HCM Control Delay, s			
HCM LOS		-	

Minor Lane/Major Mvmt	NEL	NER	WBL	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	11	80	120	27	252	4	64	18	17	7	72	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	11	83	125	28	262	4	67	19	18	7	75	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	267	0	0	208	0	0	536	492	146	508	552	265
Stage 1	-	-	-	-	-	-	169	169	-	321	321	-
Stage 2	-	-	-	-	-	-	367	323	-	187	231	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1280	-	-	1345	-	-	451	473	893	471	437	766
Stage 1	-	-	-	-	-	-	826	753	-	684	646	-
Stage 2	-	-	-	-	-	-	646	645	-	808	708	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1280	-	-	1345	-	-	371	457	893	436	422	766
Mov Cap-2 Maneuver	-	-	-	-	-	-	371	457	-	436	422	-
Stage 1	-	-	-	-	-	-	818	745	-	677	630	-
Stage 2	-	-	-	-	-	-	543	630	-	764	701	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.7	16	15
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	429	1280	-	-	1345	-	-	460
HCM Lane V/C Ratio	0.24	0.009	-	-	0.021	-	-	0.217
HCM Control Delay (s)	16	7.8	0	-	7.7	0	-	15
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	0.8

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	0	104	0	0	541	283
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	108	0	0	564	295

Major/Minor	Minor2		Major2	
Conflicting Flow All	711	428	-	0
Stage 1	711	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.6	7	-	-
Critical Hdwy Stg 1	6.6	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.55	3.35	-	-
Pot Cap-1 Maneuver	314	567	-	-
Stage 1	383	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	314	567	-	-
Mov Cap-2 Maneuver	314	-	-	-
Stage 1	383	-	-	-
Stage 2	-	-	-	-

Approach	EB	SW
HCM Control Delay, s	12.8	0
HCM LOS	B	

Minor Lane/Major Mvmt	EBLn1	SWT	SWR
Capacity (veh/h)	567	-	-
HCM Lane V/C Ratio	0.191	-	-
HCM Control Delay (s)	12.8	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.7	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	482	715	65	320	266	59	0	279	0	0	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	65	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	502	745	68	333	277	61	0	291	0	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	610	0	0	502	0	0	1124	1248	502	1109	1109	472
Stage 1	-	-	-	-	-	-	502	502	-	607	607	-
Stage 2	-	-	-	-	-	-	622	746	-	502	502	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	954	-	-	1047	-	-	180	171	563	184	207	586
Stage 1	-	-	-	-	-	-	546	537	-	478	482	-
Stage 2	-	-	-	-	-	-	469	416	-	546	537	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	954	-	-	1047	-	-	162	160	563	85	194	586
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	160	-	85	194	-
Stage 1	-	-	-	-	-	-	546	537	-	478	451	-
Stage 2	-	-	-	-	-	-	416	389	-	264	537	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.9	21.9	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	162	563	1047	-	-	954	-	-	586
HCM Lane V/C Ratio	0.379	0.516	0.065	-	-	-	-	-	0.052
HCM Control Delay (s)	40.2	18	8.7	-	-	0	-	-	11.5
HCM Lane LOS	E	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	1.6	2.9	0.2	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	10.7

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	3	263	817	29	0	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	3	274	851	30	0	21

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	887	866	0	0	881	0
Stage 1	866	-	-	-	-	-
Stage 2	21	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	311	348	-	-	755	-
Stage 1	407	-	-	-	-	-
Stage 2	994	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	311	348	-	-	755	-
Mov Cap-2 Maneuver	311	-	-	-	-	-
Stage 1	407	-	-	-	-	-
Stage 2	994	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	45.7	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	348	755	-
HCM Lane V/C Ratio	-	-	0.796	-	-
HCM Control Delay (s)	-	-	45.7	0	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	6.7	0	-

Intersection	
Int Delay, s/veh	16.7

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Vol, veh/h	236	336	2	21	170	610
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	246	350	2	22	177	635

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	246	0	272	246
Stage 1	-	-	-	-	246	-
Stage 2	-	-	-	-	26	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1303	-	711	785
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	989	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1303	-	710	785
Mov Cap-2 Maneuver	-	-	-	-	710	-
Stage 1	-	-	-	-	788	-
Stage 2	-	-	-	-	987	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0.7	29.4
HCM LOS			D

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	925	-	-	1303	-
HCM Lane V/C Ratio	0.878	-	-	0.002	-
HCM Control Delay (s)	29.4	-	-	7.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	11.8	-	-	0	-

Intersection	
Int Delay, s/veh	3.7

Movement	WBL	WBR	NET	NER	SWL	SWT
Vol, veh/h	20	110	940	140	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	8	8	5	5	5
Mvmt Flow	21	115	979	146	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	1052	1052	0	0
Stage 1	1052	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	6.28	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	3.372	-	-
Pot Cap-1 Maneuver	202	268	-	-
Stage 1	270	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	202	268	-	-
Mov Cap-2 Maneuver	202	-	-	-
Stage 1	270	-	-	-
Stage 2	-	-	-	-

Approach	WB	NE
HCM Control Delay, s	34	0
HCM LOS	D	

Minor Lane/Major Mvmt	NET	NER	WBLn1
Capacity (veh/h)	-	-	255
HCM Lane V/C Ratio	-	-	0.531
HCM Control Delay (s)	-	-	34
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	2.9

Intersection	
Int Delay, s/veh	9.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	197	442	279	0	0	455
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	205	460	291	0	0	474

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	765	291	0	0	291	0
Stage 1	291	-	-	-	-	-
Stage 2	474	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	367	741	-	-	1254	-
Stage 1	752	-	-	-	-	-
Stage 2	620	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	367	741	-	-	1254	-
Mov Cap-2 Maneuver	367	-	-	-	-	-
Stage 1	752	-	-	-	-	-
Stage 2	620	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.3	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	367	741	1254	-
HCM Lane V/C Ratio	-	-	0.559	0.621	-	-
HCM Control Delay (s)	-	-	26.6	17.5	0	-
HCM Lane LOS	-	-	D	C	A	-
HCM 95th %tile Q(veh)	-	-	3.3	4.4	0	-

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	SBL	SBR	NEL	NER
Vol, veh/h	439	120	204	16	6	715
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	0	75	50	0
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	457	125	212	17	6	745

Major/Minor	Major2		Minor2		Major1	
Conflicting Flow All	0	-	0	0	0	0
Stage 1	-	-	0	-	-	-
Stage 2	-	-	0	-	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-				-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	SB	NE
HCM Control Delay, s			
HCM LOS		-	

Minor Lane/Major Mvmt	NEL	NER	WBL	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-
HCM Control Delay (s)	-	-	-	-	-	-
HCM Lane LOS	-	-	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	20	67	136	44	150	10	64	36	26	4	40	9
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	21	70	142	46	156	10	67	38	27	4	42	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	167	0	0	211	0	0	461	440	141	468	506	161
Stage 1	-	-	-	-	-	-	182	182	-	253	253	-
Stage 2	-	-	-	-	-	-	279	258	-	215	253	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1393	-	-	1342	-	-	506	507	899	500	465	876
Stage 1	-	-	-	-	-	-	813	743	-	745	692	-
Stage 2	-	-	-	-	-	-	721	689	-	780	692	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1393	-	-	1342	-	-	445	479	899	437	440	876
Mov Cap-2 Maneuver	-	-	-	-	-	-	445	479	-	437	440	-
Stage 1	-	-	-	-	-	-	799	730	-	732	666	-
Stage 2	-	-	-	-	-	-	643	663	-	705	680	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.7	1.7	14.5	13.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	508	1393	-	-	1342	-	-	480
HCM Lane V/C Ratio	0.258	0.015	-	-	0.034	-	-	0.115
HCM Control Delay (s)	14.5	7.6	0	-	7.8	0	-	13.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	1	0	-	-	0.1	-	-	0.4

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBR	NEL	NET	SWT	SWR
Vol, veh/h	0	97	0	0	542	204
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	101	0	0	565	212

Major/Minor	Minor2		Major2	
Conflicting Flow All	671	388	-	0
Stage 1	671	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.6	7	-	-
Critical Hdwy Stg 1	6.6	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.55	3.35	-	-
Pot Cap-1 Maneuver	336	602	-	-
Stage 1	405	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	336	602	-	-
Mov Cap-2 Maneuver	336	-	-	-
Stage 1	405	-	-	-
Stage 2	-	-	-	-

Approach	EB	SW
HCM Control Delay, s	12.2	0
HCM LOS	B	

Minor Lane/Major Mvmt	EBLn1	SWT	SWR
Capacity (veh/h)	602	-	-
HCM Lane V/C Ratio	0.168	-	-
HCM Control Delay (s)	12.2	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.6	-	-

Intersection	
Int Delay, s/veh	4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Vol, veh/h	0	419	500	59	433	352	69	0	192	0	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	65	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	436	521	61	451	367	72	0	200	0	0	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	818	0	0	436	0	0	1223	1377	436	1193	1193	634
Stage 1	-	-	-	-	-	-	436	436	-	757	757	-
Stage 2	-	-	-	-	-	-	787	941	-	436	436	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	797	-	-	1108	-	-	154	143	614	161	184	474
Stage 1	-	-	-	-	-	-	593	575	-	395	411	-
Stage 2	-	-	-	-	-	-	380	338	-	593	575	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	797	-	-	1108	-	-	129	135	614	104	174	474
Mov Cap-2 Maneuver	-	-	-	-	-	-	129	135	-	104	174	-
Stage 1	-	-	-	-	-	-	593	575	-	395	388	-
Stage 2	-	-	-	-	-	-	314	319	-	400	575	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0.6	26.8	13.7
HCM LOS			D	B

Minor Lane/Major Mvmt	NELn1	NELn2	NWL	NWT	NWR	SEL	SET	SER	SWLn1
Capacity (veh/h)	129	614	1108	-	-	797	-	-	474
HCM Lane V/C Ratio	0.557	0.326	0.055	-	-	-	-	-	0.125
HCM Control Delay (s)	63.4	13.7	8.4	-	-	0	-	-	13.7
HCM Lane LOS	F	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	2.7	1.4	0.2	-	-	0	-	-	0.4

Intersection	
Int Delay, s/veh	11.3

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	7	345	565	57	0	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	7	359	589	59	0	31

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	649	618	0	0	648	0
Stage 1	618	-	-	-	-	-
Stage 2	31	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	430	484	-	-	924	-
Stage 1	532	-	-	-	-	-
Stage 2	984	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	430	484	-	-	924	-
Mov Cap-2 Maneuver	430	-	-	-	-	-
Stage 1	532	-	-	-	-	-
Stage 2	984	-	-	-	-	-

Approach	NB	NE	SW
HCM Control Delay, s	32.3	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NET	NER	NBLn1	SWL	SWT
Capacity (veh/h)	-	-	483	924	-
HCM Lane V/C Ratio	-	-	0.759	-	-
HCM Control Delay (s)	-	-	32.3	0	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	6.5	0	-

Intersection	
Int Delay, s/veh	5.9

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Vol, veh/h	233	257	4	33	170	389
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	Yield
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	243	268	4	34	177	405

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	243	0	286	243
Stage 1	-	-	-	-	243	-
Stage 2	-	-	-	-	43	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1306	-	698	788
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	972	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1306	-	696	788
Mov Cap-2 Maneuver	-	-	-	-	696	-
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	969	-

Approach	EB	WB	NW
HCM Control Delay, s	0	0.8	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	1132	-	-	1306	-
HCM Lane V/C Ratio	0.514	-	-	0.003	-
HCM Control Delay (s)	11.5	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	3	-	-	0	-

Intersection	
Int Delay, s/veh	2.6

Movement	WBL	WBR	NET	NER	SWL	SWT
Vol, veh/h	30	80	840	70	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	5	5
Mvmt Flow	31	83	875	73	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	911	911	0	0
Stage 1	911	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	6.23	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	3.327	-	-
Pot Cap-1 Maneuver	252	331	-	-
Stage 1	324	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %			-	-
Mov Cap-1 Maneuver	252	331	-	-
Mov Cap-2 Maneuver	252	-	-	-
Stage 1	324	-	-	-
Stage 2	-	-	-	-

Approach	WB	NE
HCM Control Delay, s	23.7	0
HCM LOS	C	

Minor Lane/Major Mvmt	NET	NER	WBLn1
Capacity (veh/h)	-	-	305
HCM Lane V/C Ratio	-	-	0.376
HCM Control Delay (s)	-	-	23.7
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	1.7

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*AM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

East/West Street: *W. South St.* North/South Street: *Bell St.*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*13*	*998*			*322*	*86*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*13*	*1039*	*0*	*0*	*335*	*89*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*199*		*20*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*207*	*0*	*20*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (veh/h)	*13*					*207*		*20*
C (m) (veh/h)	*1208*					*150*		*700*
v/c	*0.01*					*1.38*		*0.03*
95% queue length	*0.03*					*13.07*		*0.09*
Control Delay (s/veh)	*8.0*					*263.5*		*10.3*
LOS	*A*					*F*		*B*
Approach Delay (s/veh)	--	--				*241.2*		
Approach LOS	--	--				*F*		

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mathew Trippett*
Agency/Co.	*Bridgefarmer & Associates*
Date Performed	*2/10/2015*
Analysis Time Period	*PM*

Site Information

Intersection	
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

East/West Street: *W. South St.* North/South Street: *Bell St.*

Intersection Orientation: *East-West* Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*6*	*715*			*439*	*120*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*6*	*744*	*0*	*0*	*457*	*125*
Percent Heavy Vehicles	*5*	--	--	*5*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*1*
Lanes	*1*	*1*	*0*	*0*	*1*	*1*
Configuration	*L*	*T*			*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*204*		*16*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*212*	*0*	*16*
Percent Heavy Vehicles	*5*	*0*	*0*	*5*	*0*	*5*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*1*
Lanes	*0*	*0*	*0*	*1*	*0*	*1*
Configuration				*L*		*R*

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*					*L*		*R*
v (veh/h)	*6*					*212*		*16*
C (m) (veh/h)	*1088*					*197*		*597*
v/c	*0.01*					*1.08*		*0.03*
95% queue length	*0.02*					*9.90*		*0.08*
Control Delay (s/veh)	*8.3*					*136.0*		*11.2*
LOS	*A*					*F*		*B*
Approach Delay (s/veh)	--	--				*127.3*		
Approach LOS	--	--				*F*		

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APPENDIX E – Highway Capacity Manual 2010 Analysis

Build

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1970*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*785*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*11.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1610*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*29*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.873*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*674*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.6*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1260*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*781*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*10.4*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1300*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*852*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*11.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2170*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*861*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*11.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2010*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*28*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.877*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*838*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*11.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 5 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3400*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1292*	pc/h/ln
S	*69.9*	mph
D = v_p / S	*18.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2485*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*23*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.897*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1013*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3570*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1383*	pc/h/ln
S	*69.6*	mph
D = v_p / S	*19.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2810*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1140*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1400*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*917*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*12.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1300*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*805*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*10.7*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3220*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1230*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*17.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2560*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*21*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.905*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1034*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.8*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	372
Freeway Volume, V_F	2170
Ramp Volume, V_R	200
Freeway Free-Flow Speed, S_{FF}	72.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2584 ft
V_D = 1600 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2170	0.96	Level	17	0	0.922	0.95	2582
Ramp	200	0.96	Rolling	0	0	1.000	0.95	219
UpStream								
DownStream	1600	0.96	Rolling	1	0	0.985	0.95	1781

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.685 using Equation (Exhibit 13-7)
V_{12} = 1839 pc/h
V_3 or V_{av34} 743 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2582	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2363	Exhibit 13-8	7200	No
V_R	219	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1839	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.7 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.253 (Exhibit 13-12)
S_R= 64.9 mph (Exhibit 13-12)
S_0= 79.6 mph (Exhibit 13-12)
S = 68.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 2584 ft
V_u = veh/h	Deceleration Lane Length L_D: 372	V_D = 1200 veh/h
	Freeway Volume, V_F: 2010	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 72.6	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2010	0.96	Level	28	0	0.877	0.95	2513
Ramp	400	0.96	Rolling	2	0	0.971	0.95	452
UpStream								
DownStream	1200	0.96	Rolling	3	0	0.957	0.95	1375

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1846 pc/h

V_3 or V_{av34} 667 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2513	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2061	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1846	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 64.2 mph (Exhibit 13-12)

S_0= 79.6 mph (Exhibit 13-12)

S = 67.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	372	L_{down} =	ft
V_u =	910 veh/h	Freeway Volume, V_F	2170	V_D =	veh/h
		Ramp Volume, V_R	200		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2170	0.96	Level	17	0	0.922	0.95	2582
Ramp	200	0.96	Rolling	0	0	1.000	0.95	219
UpStream	910	0.96	Level	3	0	0.985	0.95	1013
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8906.12 (Equation 13-12 or 13-13)

P_{FD} = 0.685 using Equation (Exhibit 13-7)

V_{12} = 1839 pc/h

V_3 or V_{av34} 743 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2582	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2363	Exhibit 13-8	7200	No
V_R	219	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1839	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.253 (Exhibit 13-12)

S_R= 64.9 mph (Exhibit 13-12)

S_0= 79.6 mph (Exhibit 13-12)

S = 68.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	372	L_{down} =	ft
V_u =	710 veh/h	Freeway Volume, V_F	2010	V_D =	veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2010	0.96	Level	28	0	0.877	0.95	2513
Ramp	400	0.96	Rolling	2	0	0.971	0.95	452
UpStream	710	0.96	Level	5	0	0.976	0.95	798
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8449.18 (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1846 pc/h

V_3 or V_{av34} 667 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2513	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2061	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1846	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 64.2 mph (Exhibit 13-12)

S_0= 79.6 mph (Exhibit 13-12)

S = 67.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST. OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 6259 ft
V_u = veh/h	Deceleration Lane Length L_D: 304	V_D = 880 veh/h
	Freeway Volume, V_F: 3570	
	Ramp Volume, V_R: 350	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3570	0.96	Level	12	0	0.943	0.95	4149
Ramp	350	0.96	Level	38	0	0.840	0.95	457
UpStream								
DownStream	880	0.96	Level	8	0	0.962	0.95	1004

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.635 using Equation (Exhibit 13-7)

V_{12} = 2802 pc/h

V_3 or V_{av34} 1347 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4149	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3692	Exhibit 13-8	7200	No
V_R	457	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2802	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.534 (Exhibit 13-12)

S_R= 55.8 mph (Exhibit 13-12)

S_0= 77.3 mph (Exhibit 13-12)

S = 61.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 6259 ft
V_u = veh/h	Deceleration Lane Length L_D: 304	V_D = 675 veh/h
	Freeway Volume, V_F: 2810	
	Ramp Volume, V_R: 250	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2810	0.96	Level	22	0	0.901	0.95	3420
Ramp	250	0.96	Level	36	0	0.847	0.95	323
UpStream								
DownStream	675	0.96	Level	3	0	0.985	0.95	751

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.660 using Equation (Exhibit 13-7)

V_{12} = 2366 pc/h

V_3 or V_{av34} 1054 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3420	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3097	Exhibit 13-8	7200	No
V_R	323	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2366	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.522 (Exhibit 13-12)

S_R= 56.2 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 61.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST. OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☐ No ☐ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 5288 ft	Acceleration Lane Length, L_A:	L_{down} = ft
V_u = 1600 veh/h	Deceleration Lane Length L_D: 304	V_D = veh/h
	Freeway Volume, V_F: 3570	
	Ramp Volume, V_R: 350	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3570	0.96	Level	12	0	0.943	0.95	4149
Ramp	350	0.96	Level	38	0	0.840	0.95	457
UpStream	1600	0.96	Rolling	1	0	0.985	0.95	1781
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 13523.67 (Equation 13-12 or 13-13)

P_{FD} = 0.635 using Equation (Exhibit 13-7)

V_{12} = 2802 pc/h

V_3 or V_{av34} 1347 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4149	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3692	Exhibit 13-8	7200	No
V_R	457	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2802	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.534 (Exhibit 13-12)

S_R= 55.8 mph (Exhibit 13-12)

S_0= 77.3 mph (Exhibit 13-12)

S = 61.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	5288 ft	Deceleration Lane Length L_D	304	L_{down} =	ft
V_u =	1200 veh/h	Freeway Volume, V_F	2810	V_D =	veh/h
		Ramp Volume, V_R	250		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2810	0.96	Level	22	0	0.901	0.95	3420
Ramp	250	0.96	Level	36	0	0.847	0.95	323
UpStream	1200	0.96	Rolling	3	0	0.957	0.95	1375
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 10990.15 (Equation 13-12 or 13-13)

P_{FD} = 0.660 using Equation (Exhibit 13-7)

V_{12} = 2366 pc/h

V_3 or V_{av34} 1054 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3420	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3097	Exhibit 13-8	7200	No
V_R	323	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2366	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 21.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.522 (Exhibit 13-12)

S_R= 56.2 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 61.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{up} = 2250 ft
V_u = 880 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	190
Freeway Volume, V_F	4100
Ramp Volume, V_R	700
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4100	0.96	Level	10	0	0.952	0.95	4720
Ramp	700	0.96	Level	1	0	0.995	0.95	771
UpStream	880	0.96	Level	8	0	0.962	0.95	1004
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8299.99 (Equation 13-12 or 13-13)
P_{FD} = 0.607 using Equation (Exhibit 13-7)
V_{12} = 3166 pc/h
V_3 or V_{av34} 1554 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4720	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3949	Exhibit 13-8	7200	No
V_R	771	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3166	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.8 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.302 (Exhibit 13-12)
S_R= 62.7 mph (Exhibit 13-12)
S_0= 76.5 mph (Exhibit 13-12)
S = 66.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2250 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	675 veh/h	Freeway Volume, V_F	3235	V_D =	veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3235	0.96	Level	18	0	0.917	0.95	3866
Ramp	750	0.96	Level	1	0	0.995	0.95	826
UpStream	675	0.96	Level	3	0	0.985	0.95	751
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 7730.95 (Equation 13-12 or 13-13)

P_{FD} = 0.625 using Equation (Exhibit 13-7)

V_{12} = 2727 pc/h

V_3 or V_{av34} 1139 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3866	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3040	Exhibit 13-8	7200	No
V_R	826	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2727	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.307 (Exhibit 13-12)

S_R= 62.6 mph (Exhibit 13-12)

S_0= 78.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	441	L_{down} =	2417 ft
V_u =	veh/h	Freeway Volume, V_F	1300	V_D =	910 veh/h
		Ramp Volume, V_R	40		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1300	0.96	Level	26	0	0.885	0.95	1611
Ramp	40	0.96	Rolling	0	0	1.000	0.95	44
UpStream								
DownStream	910	0.96	Level	3	0	0.985	0.95	1013

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1611 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1611	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1567	Exhibit 13-8	4800	No
V_R	44	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1611	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 14.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.497 (Exhibit 13-12)

S_R= 57.9 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	441	L_{down} =	2417 ft
V_u =	veh/h	Freeway Volume, V_F	1400	V_D =	710 veh/h
		Ramp Volume, V_R	100		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1400	0.96	Level	39	0	0.837	0.95	1834
Ramp	100	0.96	Rolling	22	0	0.752	0.95	146
UpStream								
DownStream	710	0.96	Level	5	0	0.976	0.95	798

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1834 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1834	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	1688	Exhibit 13-8	4800	No
V_R	146	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1834	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 16.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.506 (Exhibit 13-12)

S_R= 57.6 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1295
Deceleration Lane Length L_D	
Freeway Volume, V_F	1970
Ramp Volume, V_R	1600
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 5288 ft

V_D = 350 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	18	0	0.917	0.95	2354
Ramp	1600	0.96	Rolling	1	0	0.985	0.95	1781
UpStream								
DownStream	350	0.96	Level	38	0	0.840	0.95	457

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1841.52 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 1445 pc/h

V_3 or V_{av34} 909 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4135	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3226	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 21.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.290 (Exibit 13-11)

S_R = 63.1 mph (Exhibit 13-11)

S_0 = 70.2 mph (Exhibit 13-11)

S = 64.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 1295	L_{down} = 5288 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 250 veh/h
	Freeway Volume, V_F: 1610	
	Ramp Volume, V_R: 1200	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1610	0.96	Level	29	0	0.873	0.95	2021
Ramp	1200	0.96	Rolling	3	0	0.957	0.95	1375
UpStream								
DownStream	250	0.96	Level	36	0	0.847	0.95	323

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1301.55 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 1240 pc/h

V_3 or V_{av34} 781 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3396	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2615	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.245 (Exibit 13-11)

S_R = 64.4 mph (Exhibit 13-11)

S_0 = 70.7 mph (Exhibit 13-11)

S = 65.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2584 ft

V_u = 200 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1295
Deceleration Lane Length L_D	
Freeway Volume, V_F	1970
Ramp Volume, V_R	1600
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	18	0	0.917	0.95	2354
Ramp	1600	0.96	Rolling	1	0	0.985	0.95	1781
UpStream	200	0.96	Rolling	0	0	1.000	0.95	219
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1672.87 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 1445 pc/h

V_3 or V_{av34} 909 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4135	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3226	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 21.7 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.290 (Exibit 13-11)

S_R = 63.1 mph (Exhibit 13-11)

S_0 = 70.2 mph (Exhibit 13-11)

S = 64.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2584 ft

V_u = 400 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1295
Deceleration Lane Length L_D	
Freeway Volume, V_F	1610
Ramp Volume, V_R	1200
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1610	0.96	Level	29	0	0.873	0.95	2021
Ramp	1200	0.96	Rolling	3	0	0.957	0.95	1375
UpStream	400	0.96	Rolling	2	0	0.971	0.95	452
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1514.72 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 1240 pc/h

V_3 or V_{av34} 781 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3396	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2615	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.245 (Exibit 13-11)

S_R = 64.4 mph (Exhibit 13-11)

S_0 = 70.7 mph (Exhibit 13-11)

S = 65.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 904	L_{down} = 2250 ft
V_u = veh/h	Deceleration Lane Length L_D	V_D = 700 veh/h
	Freeway Volume, V_F: 3220	
	Ramp Volume, V_R: 880	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3220	0.96	Level	9	0	0.957	0.95	3690
Ramp	880	0.96	Level	8	0	0.962	0.95	1004
UpStream								
DownStream	700	0.96	Level	1	0	0.995	0.95	771

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 3736.77 (Equation 13-6 or 13-7)

P_{FM} = 0.639 using Equation (Exhibit 13-6)

V_{12} = 2357 pc/h

V_3 or V_{av34} 1333 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2357 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4694	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3361	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.343 (Exibit 13-11)

S_R= 61.5 mph (Exhibit 13-11)

S_0= 68.7 mph (Exhibit 13-11)

S = 63.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	904
Deceleration Lane Length L_D	
Freeway Volume, V_F	2560
Ramp Volume, V_R	675
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 2250 ft

V_D = 750 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2560	0.96	Level	21	0	0.905	0.95	3102
Ramp	675	0.96	Level	3	0	0.985	0.95	751
UpStream								
DownStream	750	0.96	Level	1	0	0.995	0.95	826

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 4003.33 (Equation 13-6 or 13-7)

P_{FM} = 0.645 using Equation (Exhibit 13-6)

V_{12} = 2001 pc/h

V_3 or V_{av34} 1101 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2001 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3853	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2752	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 20.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.292 (Exibit 13-11)

S_R= 63.0 mph (Exhibit 13-11)

S_0= 69.5 mph (Exhibit 13-11)

S = 64.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	904	☑ No	☐ Off
L_{up} =	6259 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	350 veh/h	Freeway Volume, V_F	3220	V_D =	veh/h
		Ramp Volume, V_R	880		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3220	0.96	Level	9	0	0.957	0.95	3690
Ramp	880	0.96	Level	8	0	0.962	0.95	1004
UpStream	350	0.96	Level	38	0	0.840	0.95	457
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1618.89 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 2224 pc/h

V_3 or V_{av34} 1466 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2224 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4694	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3228	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.329 (Exibit 13-11)

S_R= 61.9 mph (Exhibit 13-11)

S_0= 68.2 mph (Exhibit 13-11)

S = 63.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	904	☑ No	☐ Off
L_{up} =	6259 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	250 veh/h	Freeway Volume, V_F	2560	V_D =	veh/h
		Ramp Volume, V_R	675		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2560	0.96	Level	21	0	0.905	0.95	3102
Ramp	675	0.96	Level	3	0	0.985	0.95	751
UpStream	250	0.96	Level	36	0	0.847	0.95	323
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1438.92 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 1870 pc/h

V_3 or V_{av34} 1232 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1870 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3853	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2621	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 19.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.284 (Exibit 13-11)

S_R= 63.3 mph (Exhibit 13-11)

S_0= 69.1 mph (Exhibit 13-11)

S = 65.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1270*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*25*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.727*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*638*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.1*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2360*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1147*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.4*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1345*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.735*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*669*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.6*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2585*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1257*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*18.0*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*910*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*581*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*7.7*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1660*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1060*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*14.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1370*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.893*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*561*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*8.0*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2760*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1120*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.0*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 5 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1820*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*19*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.913*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*728*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*10.4*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/19/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 5 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3610*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1432*	pc/h/ln
S	*69.4*	mph
D = v_p / S	*20.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1970*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*16*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.926*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*778*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*11.1*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4160*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*15*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1635*	pc/h/ln
S	*67.8*	mph
D = v_p / S	*24.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1720*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*685*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*9.8*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/19/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3660*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1451*	pc/h/ln
S	*69.3*	mph
D = v_p / S	*20.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*32*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*636*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*8.5*	pc/mi/ln
LOS	*A*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2018*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1700*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1086*	pc/h/ln
S	*74.9*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	990
Freeway Volume, V_F	1970
Ramp Volume, V_R	700
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	40.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2577 ft
V_D = 75 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	16	0	0.926	0.95	2333
Ramp	700	0.96	Level	6	0	0.971	0.95	791
UpStream								
DownStream	75	0.96	Rolling	0	0	1.000	0.95	82

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.450 using Equation (Exhibit 13-7)
V_{12} = 1485 pc/h
V_3 or V_{av34} 848 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2333	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	1542	Exhibit 13-8	7200	No
V_R	791	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1485	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = -0.8 (pc/mi/ln)
LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.434 (Exhibit 13-12)
S_R= 58.8 mph (Exhibit 13-12)
S_0= 78.7 mph (Exhibit 13-12)
S = 64.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 2	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 2577 ft
V_u = veh/h	Deceleration Lane Length L_D: 990	V_D = 225 veh/h
	Freeway Volume, V_F: 4160	
	Ramp Volume, V_R: 1800	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 40.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4160	0.96	Level	15	0	0.930	0.95	4904
Ramp	1800	0.96	Level	2	0	0.990	0.95	1993
UpStream								
DownStream	225	0.96	Rolling	1	0	0.985	0.95	250

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 3303 pc/h

V_3 or V_{av34} 1601 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4904	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2911	Exhibit 13-8	7200	No
V_R	1993	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3303	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 14.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.542 (Exhibit 13-12)

S_R= 55.6 mph (Exhibit 13-12)

S_0= 76.3 mph (Exhibit 13-12)

S = 61.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	2	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	4637 ft	Deceleration Lane Length L_D	990	L_{down} =	ft
V_u =	250 veh/h	Freeway Volume, V_F	1970	V_D =	veh/h
		Ramp Volume, V_R	700		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	40.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1970	0.96	Level	16	0	0.926	0.95	2333
Ramp	700	0.96	Level	6	0	0.971	0.95	791
UpStream	250	0.96	Level	3	0	0.985	0.95	278
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 1485 pc/h

V_3 or V_{av34} 848 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2333	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	1542	Exhibit 13-8	7200	No
V_R	791	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1485	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = -0.8 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.434 (Exhibit 13-12)

S_R= 58.8 mph (Exhibit 13-12)

S_0= 78.7 mph (Exhibit 13-12)

S = 64.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	2	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	4637 ft	Deceleration Lane Length L_D	990	L_{down} =	ft
V_u =	500 veh/h	Freeway Volume, V_F	4160	V_D =	veh/h
		Ramp Volume, V_R	1800		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	40.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4160	0.96	Level	15	0	0.930	0.95	4904
Ramp	1800	0.96	Level	2	0	0.990	0.95	1993
UpStream	500	0.96	Level	3	0	0.985	0.95	556
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 3303 pc/h

V_3 or V_{av34} 1601 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4904	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2911	Exhibit 13-8	7200	No
V_R	1993	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3303	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 14.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.542 (Exhibit 13-12)

S_R= 55.6 mph (Exhibit 13-12)

S_0= 76.3 mph (Exhibit 13-12)

S = 61.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5630 ft
V_u = veh/h	Deceleration Lane Length L_D: 153	V_D = 250 veh/h
	Freeway Volume, V_F: 2120	
	Ramp Volume, V_R: 400	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2120	0.96	Level	16	0	0.926	0.95	2511
Ramp	400	0.96	Level	6	0	0.971	0.95	452
UpStream								
DownStream	250	0.96	Level	3	0	0.985	0.95	278

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1845 pc/h

V_3 or V_{av34} 666 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2511	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2059	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1845	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 63.6 mph (Exhibit 13-12)

S_0= 78.7 mph (Exhibit 13-12)

S = 67.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5630 ft
V_u = veh/h	Deceleration Lane Length L_D: 153	V_D = 500 veh/h
	Freeway Volume, V_F: 4110	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4110	0.96	Level	15	0	0.930	0.95	4845
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream								
DownStream	500	0.96	Level	3	0	0.985	0.95	556

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.616 using Equation (Exhibit 13-7)

V_{12} = 3176 pc/h

V_3 or V_{av34} 1669 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4845	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4344	Exhibit 13-8	7200	No
V_R	501	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3176	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.278 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 76.0 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	300 veh/h	Freeway Volume, V_F	2120	V_D =	veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2120	0.96	Level	16	0	0.926	0.95	2511
Ramp	400	0.96	Level	6	0	0.971	0.95	452
UpStream	300	0.96	Level	1	0	0.995	0.95	331
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 3506.32 (Equation 13-12 or 13-13)

P_{FD} = 0.676 using Equation (Exhibit 13-7)

V_{12} = 1845 pc/h

V_3 or V_{av34} 666 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2511	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2059	Exhibit 13-8	7200	No
V_R	452	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1845	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 18.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_s = 0.274 (Exhibit 13-12)

S_R= 63.6 mph (Exhibit 13-12)

S_0= 78.7 mph (Exhibit 13-12)

S = 67.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	500 veh/h	Freeway Volume, V_F	4110	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4110	0.96	Level	15	0	0.930	0.95	4845
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream	500	0.96	Level	0	0	1.000	0.95	548
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 3796.09 (Equation 13-12 or 13-13)

P_{FD} = 0.616 using Equation (Exhibit 13-7)

V_{12} = 3176 pc/h

V_3 or V_{av34} 1669 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4845	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4344	Exhibit 13-8	7200	No
V_R	501	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3176	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.278 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 76.0 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A	1500	☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	1831 ft
V_u =	veh/h	Freeway Volume, V_F	1270	V_D =	25 veh/h
		Ramp Volume, V_R	75		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1270	0.96	Rolling	25	0	0.727	0.95	1915
Ramp	75	0.96	Rolling	0	0	1.000	0.95	82
UpStream								
DownStream	25	0.96	Rolling	0	0	1.000	0.95	27

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 1186 pc/h

V_3 or V_{av34} 729 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1186 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1997	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1268	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 5.9 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.245 (Exibit 13-11)

S_R= 64.4 mph (Exhibit 13-11)

S_0= 70.9 mph (Exhibit 13-11)

S = 66.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A	1500	☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	1831 ft
V_u =	veh/h	Freeway Volume, V_F	2360	V_D =	175 veh/h
		Ramp Volume, V_R	225		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2360	0.96	Rolling	22	0	0.752	0.95	3442
Ramp	225	0.96	Rolling	1	0	0.985	0.95	250
UpStream								
DownStream	175	0.96	Rolling	1	0	0.985	0.95	195

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 2132 pc/h

V_3 or V_{av34} 1310 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2132 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3692	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2382	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.273 (Exibit 13-11)

S_R= 63.6 mph (Exhibit 13-11)

S_0= 68.8 mph (Exhibit 13-11)

S = 65.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2577 ft

V_u = 700 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1500
Deceleration Lane Length L_D	
Freeway Volume, V_F	1270
Ramp Volume, V_R	75
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	30.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1270	0.96	Rolling	25	0	0.727	0.95	1915
Ramp	75	0.96	Rolling	0	0	1.000	0.95	82
UpStream	700	0.96	Level	6	0	0.971	0.95	791
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 259.96 (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 1186 pc/h

V_3 or V_{av34} 729 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1186 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1997	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1268	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 5.9 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.245 (Exibit 13-11)

S_R= 64.4 mph (Exhibit 13-11)

S_0= 70.9 mph (Exhibit 13-11)

S = 66.6 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 2577 ft
V_u = 1800 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1500
Deceleration Lane Length L_D	
Freeway Volume, V_F	2360
Ramp Volume, V_R	225
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	30.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2360	0.96	Rolling	22	0	0.752	0.95	3442
Ramp	225	0.96	Rolling	1	0	0.985	0.95	250
UpStream	1800	0.96	Level	2	0	0.990	0.95	1993
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 622.69 (Equation 13-6 or 13-7)
P_{FM} = 0.619 using Equation (Exhibit 13-6)
V_{12} = 2132 pc/h
V_3 or V_{av34} 1310 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No
If Yes,V_{12a} = 2132 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3692	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2382	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.5 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.273 (Exibit 13-11)
S_R = 63.6 mph (Exhibit 13-11)
S_0 = 68.8 mph (Exhibit 13-11)
S = 65.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☐ On
☑ No	☐ Off	Acceleration Lane Length, L_A	986	☐ No	☑ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	1634 ft
V_u =	veh/h	Freeway Volume, V_F	1820	V_D =	400 veh/h
		Ramp Volume, V_R	300		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1820	0.96	Level	19	0	0.913	0.95	2185
Ramp	300	0.96	Level	1	0	0.995	0.95	331
UpStream								
DownStream	400	0.96	Level	6	0	0.971	0.95	452

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2101.33 (Equation 13-6 or 13-7)

P_{FM} = 0.621 using Equation (Exhibit 13-6)

V_{12} = 1358 pc/h

V_3 or V_{av34} 827 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1358 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2516	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1689	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.3 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.244 (Exibit 13-11)

S_R= 64.5 mph (Exhibit 13-11)

S_0= 70.5 mph (Exhibit 13-11)

S = 66.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 986	L_{down} = 1634 ft
V_u = veh/h	Deceleration Lane Length L_D	V_D = 450 veh/h
	Freeway Volume, V_F: 3610	
	Ramp Volume, V_R: 500	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3610	0.96	Level	17	0	0.922	0.95	4295
Ramp	500	0.96	Level	0	0	1.000	0.95	548
UpStream								
DownStream	450	0.96	Level	3	0	0.985	0.95	501

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2329.13 (Equation 13-6 or 13-7)

P_{FM} = 0.629 using Equation (Exhibit 13-6)

V_{12} = 2703 pc/h

V_3 or V_{av34} 1592 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2703 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4843	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3251	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.323 (Exibit 13-11)

S_R= 62.1 mph (Exhibit 13-11)

S_0= 67.8 mph (Exhibit 13-11)

S = 63.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2962 ft

V_u = 460 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	910
Ramp Volume, V_R	90
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	910	0.96	Level	33	0	0.858	0.95	1162
Ramp	90	0.96	Rolling	0	0	1.000	0.95	99
UpStream	460	0.96	Rolling	8	0	0.893	0.95	565
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1162 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1261	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1261	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 9.7 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.247 (Exibit 13-11)

S_R = 65.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 65.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2962 ft

V_u = 1100 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	1660
Ramp Volume, V_R	40
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1660	0.96	Level	33	0	0.858	0.95	2121
Ramp	40	0.96	Rolling	10	0	0.870	0.95	50
UpStream	1100	0.96	Rolling	1	0	0.985	0.95	1224
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2121 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2171	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2171	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 16.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R = 64.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 911	L_{down} = 4637 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 700 veh/h
	Freeway Volume, V_F: 1720	
	Ramp Volume, V_R: 250	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1720	0.96	Level	18	0	0.917	0.95	2056
Ramp	250	0.96	Level	3	0	0.985	0.95	278
UpStream								
DownStream	700	0.96	Level	6	0	0.971	0.95	791

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 3819.84 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 1240 pc/h

V_3 or V_{av34} 816 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2334	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1518	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.248 (Exibit 13-11)

S_R = 64.0 mph (Exhibit 13-11)

S_0 = 70.2 mph (Exhibit 13-11)

S = 66.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 911	L_{down} = 4637 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 1800 veh/h
	Freeway Volume, V_F: 3660	
	Ramp Volume, V_R: 500	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3660	0.96	Level	17	0	0.922	0.95	4354
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream								
DownStream	1800	0.96	Level	2	0	0.990	0.95	1993

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 9624.44 (Equation 13-6 or 13-7)

P_{FM} = 0.662 using Equation (Exhibit 13-6)

V_{12} = 2881 pc/h

V_3 or V_{av34} 1473 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4910	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3437	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.351 (Exibit 13-11)

S_R = 61.0 mph (Exhibit 13-11)

S_0 = 67.8 mph (Exhibit 13-11)

S = 62.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	911	☑ No	☐ Off
L_{up} =	5630 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	400 veh/h	Freeway Volume, V_F	1720	V_D =	veh/h
		Ramp Volume, V_R	250		
		Freeway Free-Flow Speed, S_{FF}	71.3		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1720	0.96	Level	18	0	0.917	0.95	2056
Ramp	250	0.96	Level	3	0	0.985	0.95	278
UpStream	400	0.96	Level	6	0	0.971	0.95	452
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1116.96 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 1240 pc/h

V_3 or V_{av34} 816 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2334	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1518	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.5 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.248 (Exibit 13-11)

S_R = 64.0 mph (Exhibit 13-11)

S_0 = 70.2 mph (Exhibit 13-11)

S = 66.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/19/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2018

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A: 911	L_{down} = 5630 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 450 veh/h
	Freeway Volume, V_F: 3660	
	Ramp Volume, V_R: 500	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3660	0.96	Level	17	0	0.922	0.95	4354
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream								
DownStream	450	0.96	Level	3	0	0.985	0.95	501

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 2625 pc/h

V_3 or V_{av34} 1729 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4910	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3181	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 24.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.324 (Exibit 13-11)

S_R= 61.8 mph (Exhibit 13-11)

S_0= 66.9 mph (Exhibit 13-11)

S = 63.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Mathew Trippett
Agency/Company	Bridgefarmer & Assoc.
Date Performed	3/30/2015
Analysis Time Period	AM

Site Information

Freeway/Dir of Travel	WB
Weaving Segment Location	HWY 67 ON-RAMP/INSPECTION STA
Analysis Year	2018

Project Description CA0601

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1138ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	1345	0.96	24	0	1.5	1.2	0.893	0.95	1652
V_{RF}	25	0.96	0	0	1.5	1.2	1.000	0.95	27
V_{FR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{RR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{NW}	1652							V =	1679
V_W	27								
VR	0.016								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	27 lc/h
Interchange density, ID	0.6 int/mi	Weaving lane changes, LC_W	290 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	187 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	477 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	113

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	veh/h	Weaving intensity factor, W	0.114
Weaving segment capacity, c_w	veh/h	Weaving segment speed, S	67.7 mph
Weaving segment v/c ratio		Average weaving speed, S_W	64.4 mph
Weaving segment density, D	6.2 pc/mi/ln	Average non-weaving speed, S_{NW}	67.8 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	2744 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Mathew Trippett
Agency/Company	Bridgefarmer & Assoc.
Date Performed	3/30/2015
Analysis Time Period	PM

Site Information

Freeway/Dir of Travel	WB
Weaving Segment Location	HWY 67 ON-RAMP/INSPECTION STA
Analysis Year	2018

Project Description CA0601

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1138ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2585	0.96	22	0	1.5	1.2	0.901	0.95	3146
V_{RF}	175	0.96	1	0	1.5	1.2	0.995	0.95	193
V_{FR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{RR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{NW}	3146							V =	3339
V_W	193								
VR	0.058								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	193 lc/h
Interchange density, ID	0.6 int/mi	Weaving lane changes, LC_W	456 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	494 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	950 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	215

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	2875 veh/h	Weaving intensity factor, W	0.196
Weaving segment capacity, c_w	7692 veh/h	Weaving segment speed, S	64.4 mph
Weaving segment v/c ratio	0.374	Average weaving speed, S_W	61.0 mph
Weaving segment density, D	13.0 pc/mi/ln	Average non-weaving speed, S_{NW}	64.6 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	3135 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	185	0	15	0	0	0	0	115	900	700	570	0
Number	5	2	12				3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	0	1750				0	1667	1733	1733	1667	0
Adj Flow Rate, veh/h	193	0	0				0	120	678	729	594	0
Adj No. of Lanes	2	0	1				0	2	2	2	2	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0				0	5	1	1	5	0
Cap, veh/h	805	0	370				0	907	743	887	1983	0
Arrive On Green	0.25	0.00	0.00				0.00	0.29	0.29	0.28	0.63	0.00
Sat Flow, veh/h	3233	0	1487				0	3250	2592	3201	3250	0
Grp Volume(v), veh/h	193	0	0				0	120	678	729	594	0
Grp Sat Flow(s),veh/h/ln	1617	0	1487				0	1583	1296	1601	1583	0
Q Serve(g_s), s	3.8	0.0	0.0				0.0	2.2	20.2	17.1	6.9	0.0
Cycle Q Clear(g_c), s	3.8	0.0	0.0				0.0	2.2	20.2	17.1	6.9	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	805	0	370				0	907	743	887	1983	0
V/C Ratio(X)	0.24	0.00	0.00				0.00	0.13	0.91	0.82	0.30	0.00
Avail Cap(c_a), veh/h	805	0	370				0	950	778	1000	2138	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	24.0	0.0	0.0				0.0	21.2	27.6	27.1	6.9	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0				0.0	0.1	14.7	5.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0				0.0	1.0	8.7	8.1	3.0	0.0
LnGrp Delay(d),s/veh	24.2	0.0	0.0				0.0	21.2	42.3	32.1	7.0	0.0
LnGrp LOS	C							C	D	C	A	
Approach Vol, veh/h		193						798			1323	
Approach Delay, s/veh		24.2						39.1			20.8	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		24.9		55.1			27.2	27.9
Change Period (Y+Rc), s		5.0		5.0			5.0	5.0
Max Green Setting (Gmax), s		16.0		54.0			25.0	24.0
Max Q Clear Time (g_c+I1), s		5.8		8.9			19.1	22.2
Green Ext Time (p_c), s		0.4		7.2			3.1	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	27.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	380	0	20	0	0	0	0	370	400	800	1200	0
Number	5	2	12				3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1716	0	1716				0	1667	1699	1699	1667	0
Adj Flow Rate, veh/h	396	0	0				0	385	417	833	1250	0
Adj No. of Lanes	2	0	1				0	2	2	2	2	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	0	2				0	5	3	3	5	0
Cap, veh/h	1059	0	487				0	625	501	948	1757	0
Arrive On Green	0.33	0.00	0.00				0.00	0.20	0.20	0.30	0.55	0.00
Sat Flow, veh/h	3170	0	1458				0	3250	2542	3139	3250	0
Grp Volume(v), veh/h	396	0	0				0	385	417	833	1250	0
Grp Sat Flow(s),veh/h/ln	1585	0	1458				0	1583	1271	1570	1583	0
Q Serve(g_s), s	8.6	0.0	0.0				0.0	10.0	14.2	22.7	26.1	0.0
Cycle Q Clear(g_c), s	8.6	0.0	0.0				0.0	10.0	14.2	22.7	26.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1059	0	487				0	625	501	948	1757	0
V/C Ratio(X)	0.37	0.00	0.00				0.00	0.62	0.83	0.88	0.71	0.00
Avail Cap(c_a), veh/h	1059	0	487				0	633	508	1256	2076	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.8	0.0	0.0				0.0	33.0	34.7	29.8	14.7	0.0
Incr Delay (d2), s/veh	0.2	0.0	0.0				0.0	1.8	11.1	5.9	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0				0.0	4.5	5.8	10.6	11.5	0.0
LnGrp Delay(d),s/veh	23.0	0.0	0.0				0.0	34.8	45.8	35.7	15.7	0.0
LnGrp LOS	C							C	D	D	B	
Approach Vol, veh/h		396						802			2083	
Approach Delay, s/veh		23.0						40.5			23.7	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		35.1		54.9			32.2	22.7
Change Period (Y+Rc), s		5.0		5.0			5.0	5.0
Max Green Setting (Gmax), s		21.0		59.0			36.0	18.0
Max Q Clear Time (g_c+I1), s		10.6		28.1			24.7	16.2
Green Ext Time (p_c), s		1.0		15.5			2.5	1.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.7
HCM 2010 LOS	C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	25	0	650	400	250	50	75	150	75	0	245	55
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	0	1667	1651	1651	1651	1667	1667	1750	0	1667	1667
Adj Flow Rate, veh/h	26	0	594	417	260	0	78	156	0	0	255	0
Adj No. of Lanes	1	0	2	2	2	1	2	2	1	0	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	0	5	6	6	6	5	5	0	0	5	5
Cap, veh/h	579	0	0	2132	706	316	395	705	331	0	377	168
Arrive On Green	0.36	0.00	0.00	0.65	0.22	0.00	0.04	0.22	0.00	0.00	0.12	0.00
Sat Flow, veh/h	1587	26		3050	3137	1403	3079	3167	1487	0	3250	1417
Grp Volume(v), veh/h	26	16.4		417	260	0	78	156	0	0	255	0
Grp Sat Flow(s),veh/h/ln	1587	B		1525	1568	1403	1540	1583	1487	0	1583	1417
Q Serve(g_s), s	0.8			0.1	5.6	0.0	1.7	3.2	0.0	0.0	6.2	0.0
Cycle Q Clear(g_c), s	0.8			0.1	5.6	0.0	1.7	3.2	0.0	0.0	6.2	0.0
Prop In Lane	1.00			1.00		1.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	579			2132	706	316	395	705	331	0	377	168
V/C Ratio(X)	0.04			0.20	0.37	0.00	0.20	0.22	0.00	0.00	0.68	0.00
Avail Cap(c_a), veh/h	579			2132	706	316	769	1346	632	0	633	283
HCM Platoon Ratio	1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00			1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	16.4			5.6	26.2	0.0	27.7	25.4	0.0	0.0	33.8	0.0
Incr Delay (d2), s/veh	0.0			0.0	1.5	0.0	0.2	0.2	0.0	0.0	2.1	0.0
Initial Q Delay(d3),s/veh	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4			1.6	2.6	0.0	0.7	1.4	0.0	0.0	2.8	0.0
LnGrp Delay(d),s/veh	16.4			5.6	27.7	0.0	27.9	25.6	0.0	0.0	35.9	0.0
LnGrp LOS	B			A	C		C	C			D	
Approach Vol, veh/h					677			234			255	
Approach Delay, s/veh					14.1			26.4			35.9	
Approach LOS					B			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5		7	8
Phs Duration (G+Y+Rc), s	34.2	23.0		22.8	57.2		8.3	14.5
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0		5.0	5.0
Max Green Setting (Gmax), s	13.0	18.0		34.0	13.0		13.0	16.0
Max Q Clear Time (g_c+I1), s	2.8	7.6		5.2	2.1		3.7	8.2
Green Ext Time (p_c), s	0.1	1.1		2.3	1.2		0.1	1.3

Intersection Summary	
HCM 2010 Ctrl Delay	21.2
HCM 2010 LOS	C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	50	0	750	850	750	200	225	300	225	0	575	175
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	0	1667	1716	1716	1716	1667	1667	1733	0	1667	1667
Adj Flow Rate, veh/h	52	0	625	885	781	0	234	312	0	0	599	0
Adj No. of Lanes	1	0	2	2	2	1	2	2	1	0	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	0	5	2	2	2	5	5	1	0	5	5
Cap, veh/h	411	0	0	1843	906	405	452	1099	511	0	662	296
Arrive On Green	0.21	0.00	0.00	0.54	0.28	0.00	0.08	0.35	0.00	0.00	0.21	0.00
Sat Flow, veh/h	1587	52		3170	3260	1458	3079	3167	1473	0	3250	1417
Grp Volume(v), veh/h	52	28.3		885	781	0	234	312	0	0	599	0
Grp Sat Flow(s),veh/h/ln	1587	C		1585	1630	1458	1540	1583	1473	0	1583	1417
Q Serve(g_s), s	0.0			11.0	20.5	0.0	5.1	6.4	0.0	0.0	16.6	0.0
Cycle Q Clear(g_c), s	0.0			11.0	20.5	0.0	5.1	6.4	0.0	0.0	16.6	0.0
Prop In Lane	1.00			1.00		1.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	411			1843	906	405	452	1099	511	0	662	296
V/C Ratio(X)	0.13			0.48	0.86	0.00	0.52	0.28	0.00	0.00	0.90	0.00
Avail Cap(c_a), veh/h	411			1843	906	405	643	1302	605	0	669	299
HCM Platoon Ratio	1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00			1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	28.2			12.1	30.9	0.0	25.2	21.3	0.0	0.0	34.7	0.0
Incr Delay (d2), s/veh	0.1			0.2	10.6	0.0	0.9	0.1	0.0	0.0	15.7	0.0
Initial Q Delay(d3),s/veh	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0			6.2	10.6	0.0	2.2	2.8	0.0	0.0	8.7	0.0
LnGrp Delay(d),s/veh	28.3			12.3	41.5	0.0	26.1	21.4	0.0	0.0	50.4	0.0
LnGrp LOS	C			B	D		C	C			D	
Approach Vol, veh/h					1666			546			599	
Approach Delay, s/veh					26.0			23.4			50.4	
Approach LOS					C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5		7	8
Phs Duration (G+Y+Rc), s	23.8	30.0		36.2	53.8		12.4	23.8
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0		5.0	5.0
Max Green Setting (Gmax), s	13.0	25.0		37.0	13.0		13.0	19.0
Max Q Clear Time (g_c+I1), s	2.0	22.5		8.4	13.0		7.1	18.6
Green Ext Time (p_c), s	0.2	1.2		5.7	0.0		0.4	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	30.7
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	20	1000	515	70	15	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	21	1042	536	73	16	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	536	0	-	0	1099	268
Stage 1	-	-	-	-	536	-
Stage 2	-	-	-	-	563	-
Critical Hdwy	4.2	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.25	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	1008	-	-	-	202	721
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	525	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1008	-	-	-	198	721
Mov Cap-2 Maneuver	-	-	-	-	198	-
Stage 1	-	-	-	-	542	-
Stage 2	-	-	-	-	514	-

Approach	EB	WB	SE
HCM Control Delay, s	0.2	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1008	-	-	-	396
HCM Lane V/C Ratio	0.021	-	-	-	0.079
HCM Control Delay (s)	8.6	-	-	-	14.9
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	10	750	1120	100	20	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	10	781	1167	104	21	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1167	0	-	0	1578	583
Stage 1	-	-	-	-	1167	-
Stage 2	-	-	-	-	411	-
Critical Hdwy	4.2	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.25	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	578	-	-	-	97	448
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	629	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	578	-	-	-	95	448
Mov Cap-2 Maneuver	-	-	-	-	95	-
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	618	-

Approach	EB	WB	SE
HCM Control Delay, s	0.1	0	29.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	578	-	-	-	190
HCM Lane V/C Ratio	0.018	-	-	-	0.219
HCM Control Delay (s)	11.3	-	-	-	29.2
HCM Lane LOS	B	-	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8

Intersection	
Int Delay, s/veh	1.2

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	50	338	542	64	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	Free	-	None
Storage Length	0	150	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	8	8	5	5	5
Mvmt Flow	52	352	565	67	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	565	-	0	-
Stage 1	565	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	-	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	-	-	-
Pot Cap-1 Maneuver	431	0	-	0
Stage 1	504	0	-	0
Stage 2	-	0	-	0
Platoon blocked, %			-	
Mov Cap-1 Maneuver	431	-	-	-
Mov Cap-2 Maneuver	431	-	-	-
Stage 1	504	-	-	-
Stage 2	-	-	-	-

Approach	NB	NE
HCM Control Delay, s	14.5	0
HCM LOS	B	

Minor Lane/Major Mvmt	NET	NBLn1	NBLn2
Capacity (veh/h)	-	431	-
HCM Lane V/C Ratio	-	0.121	-
HCM Control Delay (s)	-	14.5	0
HCM Lane LOS	-	B	A
HCM 95th %tile Q(veh)	-	0.4	-

Intersection	
Int Delay, s/veh	1.9

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	65	316	359	93	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	Free	-	None
Storage Length	0	150	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	5	5
Mvmt Flow	68	329	374	97	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	374	-	0	-
Stage 1	374	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	-	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	-	-	-
Pot Cap-1 Maneuver	578	0	-	0
Stage 1	641	0	-	0
Stage 2	-	0	-	0
Platoon blocked, %			-	
Mov Cap-1 Maneuver	578	-	-	-
Mov Cap-2 Maneuver	578	-	-	-
Stage 1	641	-	-	-
Stage 2	-	-	-	-

Approach	NB	NE
HCM Control Delay, s	12.1	0
HCM LOS	B	

Minor Lane/Major Mvmt	NET	NBLn1	NBLn2
Capacity (veh/h)	-	578	-
HCM Lane V/C Ratio	-	0.117	-
HCM Control Delay (s)	-	12.1	0
HCM Lane LOS	-	B	A
HCM 95th %tile Q(veh)	-	0.4	-

Intersection	
Int Delay, s/veh	2.9

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	88	428	178	0	0	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	92	446	185	0	0	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	237	-	0	0	185	0
Stage 1	185	-	-	-	-	-
Stage 2	52	-	-	-	-	-
Critical Hdwy	6.45	-	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	-	-	-	2.245	-
Pot Cap-1 Maneuver	745	0	-	-	1372	-
Stage 1	839	0	-	-	-	-
Stage 2	963	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	745	-	-	-	1372	-
Mov Cap-2 Maneuver	745	-	-	-	-	-
Stage 1	839	-	-	-	-	-
Stage 2	963	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	10.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	745	-	1372	-
HCM Lane V/C Ratio	-	-	0.123	-	-	-
HCM Control Delay (s)	-	-	10.5	0	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.4	-	0	-

Intersection	
Int Delay, s/veh	2.7

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	83	267	185	0	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	86	278	193	0	0	68

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	261	-	0	0	193	0
Stage 1	193	-	-	-	-	-
Stage 2	68	-	-	-	-	-
Critical Hdwy	6.45	-	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	-	-	-	2.245	-
Pot Cap-1 Maneuver	721	0	-	-	1362	-
Stage 1	833	0	-	-	-	-
Stage 2	947	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	721	-	-	-	1362	-
Mov Cap-2 Maneuver	721	-	-	-	-	-
Stage 1	833	-	-	-	-	-
Stage 2	947	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	10.7	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	721	-	1362	-
HCM Lane V/C Ratio	-	-	0.12	-	-	-
HCM Control Delay (s)	-	-	10.7	0	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.4	-	0	-

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	8	140	8	0	2	187	3	0	48	13	13
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	8	146	8	0	2	195	3	0	50	14	14
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.8	9.1	8.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	5%	1%	75%
Vol Thru, %	18%	90%	97%	7%
Vol Right, %	18%	5%	2%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	74	156	192	71
LT Vol	48	8	2	53
Through Vol	13	140	187	5
RT Vol	13	8	3	13
Lane Flow Rate	77	163	200	74
Geometry Grp	1	1	1	1
Degree of Util (X)	0.106	0.206	0.252	0.102
Departure Headway (Hd)	4.945	4.57	4.541	4.964
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	724	785	790	721
Service Time	2.983	2.6	2.571	3.002
HCM Lane V/C Ratio	0.106	0.208	0.253	0.103
HCM Control Delay	8.6	8.8	9.1	8.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.8	1	0.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	53	5	13
Peak Hour Factor	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5
Mvmt Flow	0	55	5	14
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.6
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	15	144	7	0	3	112	7	0	48	26	19
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	16	150	7	0	3	117	7	0	50	27	20
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.7	8.3	8.4
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	52%	9%	2%	79%
Vol Thru, %	28%	87%	92%	5%
Vol Right, %	20%	4%	6%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	93	166	122	39
LT Vol	48	15	3	31
Through Vol	26	144	112	2
RT Vol	19	7	7	6
Lane Flow Rate	97	173	127	41
Geometry Grp	1	1	1	1
Degree of Util (X)	0.127	0.214	0.158	0.055
Departure Headway (Hd)	4.703	4.453	4.48	4.86
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	762	808	801	737
Service Time	2.728	2.475	2.504	2.889
HCM Lane V/C Ratio	0.127	0.214	0.159	0.056
HCM Control Delay	8.4	8.7	8.3	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.8	0.6	0.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	31	2	6
Peak Hour Factor	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5
Mvmt Flow	0	32	2	6
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	4.5
Intersection LOS	A

Approach	SE	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	263	442	673
Demand Flow Rate, veh/h	276	464	707
Vehicles Circulating, veh/h	146	0	464
Vehicles Exiting, veh/h	464	422	0
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	6.8	7.7	1.6
Approach LOS	A	A	A

Lane	Left	Left	Left	Bypass
Designated Moves	R	L	T	R
Assumed Moves	R	L	T	R
RT Channelized				Free
Lane Util	1.000	1.000	1.000	
Critical Headway, s	5.193	5.193	5.193	
Entry Flow, veh/h	276	464	146	561
Cap Entry Lane, veh/h	976	1130	710	1837
Entry HV Adj Factor	0.953	0.953	0.952	0.952
Flow Entry, veh/h	263	442	139	534
Cap Entry, veh/h	930	1076	677	1750
V/C Ratio	0.283	0.411	0.205	0.305
Control Delay, s/veh	6.8	7.7	7.7	0.0
LOS	A	A	A	A
95th %tile Queue, veh	1	2	1	1

Intersection	
Intersection Delay, s/veh	4.0
Intersection LOS	A

Approach	SE	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	351	215	652
Demand Flow Rate, veh/h	369	226	685
Vehicles Circulating, veh/h	160	0	226
Vehicles Exiting, veh/h	226	529	0
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.3	5.2	1.4
Approach LOS	A	A	A

Lane	Left	Left	Left	Bypass
Designated Moves	R	L	T	R
Assumed Moves	R	L	T	R
RT Channelized				Free
Lane Util	1.000	1.000	1.000	
Critical Headway, s	5.193	5.193	5.193	
Entry Flow, veh/h	369	226	160	525
Cap Entry Lane, veh/h	963	1130	901	1837
Entry HV Adj Factor	0.951	0.951	0.952	0.952
Flow Entry, veh/h	351	215	152	500
Cap Entry, veh/h	916	1075	858	1750
V/C Ratio	0.383	0.200	0.178	0.286
Control Delay, s/veh	8.3	5.2	6.0	0.0
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	1

1: W South St & Bell St Performance by movement

Movement	WBL	WBR	SER	NEL	NER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	0.4	0.2	1.4	1.0	0.5	0.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.2	0.0	0.0	0.0

1: W South St & Bell St. Performance by movement

Movement	WBL	WBR	SER	NEL	NER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.2	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.1
Total Del/Veh (s)	0.6	0.4	1.3	2.1	0.3	0.4
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.4	1.8	0.0	0.0

5: Ramp A/W South St Performance by movement

Movement	EBT	WBR	SEL	All
Denied Delay (hr)	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.0	0.9	0.0	0.4
Total Delay (hr)	0.3	0.1	0.0	0.4
Total Del/Veh (s)	6.9	0.9	0.3	2.2
Stop Delay (hr)	0.1	0.0	0.0	0.1
Stop Del/Veh (s)	2.8	0.0	0.0	0.7

5: Ramp A/W South St Performance by movement

Movement	EBT	WBR	SEL	All
Denied Delay (hr)	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.0	0.7	0.0	0.4
Total Delay (hr)	0.1	0.1	0.0	0.2
Total Del/Veh (s)	4.3	0.9	0.1	1.2
Stop Delay (hr)	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.9	0.0	0.0	0.1

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3150*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1255*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*17.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2770*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*29*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.873*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1159*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1239*	pc/h/ln
S	*74.4*	mph
D = v_p / S	*16.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2270*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1487*	pc/h/ln
S	*72.4*	mph
D = v_p / S	*20.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1388*	pc/h/ln
S	*73.3*	mph
D = v_p / S	*18.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*HWY 70 / HWY 67*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3520*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*28*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.877*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*0.83*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.8*	mph
FFS	*72.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1467*	pc/h/ln
S	*72.6*	mph
D = v_p / S	*20.2*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1711*	pc/h/ln
S	*67.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1957*	pc/h/ln
S	*63.4*	mph
D = v_p / S	*30.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*HWY 67-229 Ramp/South St Ramp*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4470*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1813*	pc/h/ln
S	*65.6*	mph
D = v_p / S	*27.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2070*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*26*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.885*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1282*	pc/h/ln
S	*74.1*	mph
D = v_p / S	*17.3*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2470*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*39*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.837*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.50*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*1.8*	mph
FFS	*73.6*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1618*	pc/h/ln
S	*70.8*	mph
D = v_p / S	*22.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 EB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4450*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1700*	pc/h/ln
S	*67.1*	mph
D = v_p / S	*25.3*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*SOUTH ST ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4020*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*21*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.905*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1624*	pc/h/ln
S	*67.9*	mph
D = v_p / S	*23.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 EB*
From/To	*NORTHEAST OF HWY 5*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3840*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*23*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.897*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1565*	pc/h/ln
S	*68.5*	mph
D = v_p / S	*22.9*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	372
Freeway Volume, V_F	3500
Ramp Volume, V_R	350
Freeway Free-Flow Speed, S_{FF}	72.6
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2584 ft
V_D = 1900 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3500	0.96	Level	17	0	0.922	0.95	4164
Ramp	350	0.96	Rolling	0	0	1.000	0.95	384
UpStream								
DownStream	1900	0.96	Rolling	1	0	0.985	0.95	2115

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.638 using Equation (Exhibit 13-7)
V_{12} = 2797 pc/h
V_3 or V_{av34} 1367 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4164	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3780	Exhibit 13-8	7200	No
V_R	384	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2797	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.0 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.268 (Exhibit 13-12)
S_R= 64.4 mph (Exhibit 13-12)
S_0= 78.2 mph (Exhibit 13-12)
S = 68.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 2584 ft
V_u = veh/h	Deceleration Lane Length L_D: 372	V_D = 1700 veh/h
	Freeway Volume, V_F: 3520	
	Ramp Volume, V_R: 750	
	Freeway Free-Flow Speed, S_{FF}: 72.6	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3520	0.96	Level	28	0	0.877	0.95	4400
Ramp	750	0.96	Rolling	2	0	0.971	0.95	847
UpStream								
DownStream	1700	0.96	Rolling	3	0	0.957	0.95	1948

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.611 using Equation (Exhibit 13-7)

V_{12} = 3018 pc/h

V_3 or V_{av34} 1382 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4400	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3553	Exhibit 13-8	7200	No
V_R	847	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3018	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.309 (Exhibit 13-12)

S_R= 63.1 mph (Exhibit 13-12)

S_0= 78.2 mph (Exhibit 13-12)

S = 67.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	372	L_{down} =	ft
V_u =	1500 veh/h	Freeway Volume, V_F	3500	V_D =	veh/h
		Ramp Volume, V_R	350		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3500	0.96	Level	17	0	0.922	0.95	4164
Ramp	350	0.96	Rolling	0	0	1.000	0.95	384
UpStream	1500	0.96	Level	3	0	0.985	0.95	1669
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 12130.42 (Equation 13-12 or 13-13)

P_{FD} = 0.655 using Equation (Exhibit 13-7)

V_{12} = 2861 pc/h

V_3 or V_{av34} 1303 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4164	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3780	Exhibit 13-8	7200	No
V_R	384	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2861	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 25.5 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.268 (Exhibit 13-12)

S_R= 64.4 mph (Exhibit 13-12)

S_0= 78.5 mph (Exhibit 13-12)

S = 68.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	9999 ft	Deceleration Lane Length L_D	372	L_{down} =	ft
V_u =	1250 veh/h	Freeway Volume, V_F	3520	V_D =	veh/h
		Ramp Volume, V_R	750		
		Freeway Free-Flow Speed, S_{FF}	72.6		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3520	0.96	Level	28	0	0.877	0.95	4400
Ramp	750	0.96	Rolling	2	0	0.971	0.95	847
UpStream	1250	0.96	Level	5	0	0.976	0.95	1405
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 13030.01 (Equation 13-12 or 13-13)

P_{FD} = 0.630 using Equation (Exhibit 13-7)

V_{12} = 3086 pc/h

V_3 or V_{av34} 1314 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4400	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3553	Exhibit 13-8	7200	No
V_R	847	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3086	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.4 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.309 (Exhibit 13-12)

S_R= 63.1 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 67.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 6259 ft
V_u = veh/h	Deceleration Lane Length L_D: 304	V_D = 1050 veh/h
	Freeway Volume, V_F: 5050	
	Ramp Volume, V_R: 600	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5050	0.96	Level	12	0	0.943	0.95	5870
Ramp	600	0.96	Level	38	0	0.840	0.95	783
UpStream								
DownStream	1050	0.96	Level	8	0	0.962	0.95	1197

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.577 using Equation (Exhibit 13-7)

V_{12} = 3719 pc/h

V_3 or V_{av34} 2151 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5870	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	5087	Exhibit 13-8	7200	No
V_R	783	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3719	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.563 (Exhibit 13-12)

S_R= 55.0 mph (Exhibit 13-12)

S_0= 74.2 mph (Exhibit 13-12)

S = 60.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 6259 ft
V_u = veh/h	Deceleration Lane Length L_D: 304	V_D = 920 veh/h
	Freeway Volume, V_F: 4470	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 30.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4470	0.96	Level	22	0	0.901	0.95	5440
Ramp	450	0.96	Level	36	0	0.847	0.95	582
UpStream								
DownStream	920	0.96	Level	3	0	0.985	0.95	1024

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.597 using Equation (Exhibit 13-7)

V_{12} = 3483 pc/h

V_3 or V_{av34} 1957 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5440	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4858	Exhibit 13-8	7200	No
V_R	582	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3483	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 31.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.545 (Exhibit 13-12)

S_R= 55.5 mph (Exhibit 13-12)

S_0= 74.9 mph (Exhibit 13-12)

S = 61.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	5288 ft	Deceleration Lane Length L_D	304	L_{down} =	ft
V_u =	1900 veh/h	Freeway Volume, V_F	5050	V_D =	veh/h
		Ramp Volume, V_R	600		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5050	0.96	Level	12	0	0.943	0.95	5870
Ramp	600	0.96	Level	38	0	0.840	0.95	783
UpStream	1900	0.96	Rolling	1	0	0.985	0.95	2115
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 14436.66 (Equation 13-12 or 13-13)

P_{FD} = 0.577 using Equation (Exhibit 13-7)

V_{12} = 3719 pc/h

V_3 or V_{av34} 2151 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5870	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	5087	Exhibit 13-8	7200	No
V_R	783	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3719	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.563 (Exhibit 13-12)

S_R= 55.0 mph (Exhibit 13-12)

S_0= 74.2 mph (Exhibit 13-12)

S = 60.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	5288 ft	Deceleration Lane Length L_D	304	L_{down} =	ft
V_u =	1700 veh/h	Freeway Volume, V_F	4470	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4470	0.96	Level	22	0	0.901	0.95	5440
Ramp	450	0.96	Level	36	0	0.847	0.95	582
UpStream	1700	0.96	Rolling	3	0	0.957	0.95	1948
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 12825.24 (Equation 13-12 or 13-13)

P_{FD} = 0.597 using Equation (Exhibit 13-7)

V_{12} = 3483 pc/h

V_3 or V_{av34} 1957 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5440	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4858	Exhibit 13-8	7200	No
V_R	582	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3483	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 31.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.545 (Exhibit 13-12)

S_R= 55.5 mph (Exhibit 13-12)

S_0= 74.9 mph (Exhibit 13-12)

S = 61.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2250 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	1050 veh/h	Freeway Volume, V_F	5500	V_D =	veh/h
		Ramp Volume, V_R	1000		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5500	0.96	Level	10	0	0.952	0.95	6332
Ramp	1000	0.96	Level	1	0	0.995	0.95	1102
UpStream	1050	0.96	Level	8	0	0.962	0.95	1197
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 9007.86 (Equation 13-12 or 13-13)

P_{FD} = 0.551 using Equation (Exhibit 13-7)

V_{12} = 3984 pc/h

V_3 or V_{av34} 2348 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6332	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	5230	Exhibit 13-8	7200	No
V_R	1102	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3984	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 36.8 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.332 (Exhibit 13-12)

S_R= 61.8 mph (Exhibit 13-12)

S_0= 73.4 mph (Exhibit 13-12)

S = 65.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2250 ft	Deceleration Lane Length L_D	190	L_{down} =	ft
V_u =	920 veh/h	Freeway Volume, V_F	4940	V_D =	veh/h
		Ramp Volume, V_R	1100		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4940	0.96	Level	18	0	0.917	0.95	5904
Ramp	1100	0.96	Level	1	0	0.995	0.95	1212
UpStream	920	0.96	Level	3	0	0.985	0.95	1024
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 8929.19 (Equation 13-12 or 13-13)

P_{FD} = 0.557 using Equation (Exhibit 13-7)

V_{12} = 3824 pc/h

V_3 or V_{av34} 2080 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	5904	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4692	Exhibit 13-8	7200	No
V_R	1212	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3824	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 35.4 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.342 (Exhibit 13-12)

S_R= 61.5 mph (Exhibit 13-12)

S_0= 74.4 mph (Exhibit 13-12)

S = 65.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	441	L_{down} =	2417 ft
V_u =	veh/h	Freeway Volume, V_F	2070	V_D =	1500 veh/h
		Ramp Volume, V_R	70		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2070	0.96	Level	26	0	0.885	0.95	2565
Ramp	70	0.96	Rolling	0	0	1.000	0.95	77
UpStream								
DownStream	1500	0.96	Level	3	0	0.985	0.95	1669

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 2565 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	2565	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2488	Exhibit 13-8	4800	No
V_R	77	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2565	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 22.3 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.500 (Exhibit 13-12)

S_R= 57.8 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.8 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	2	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	2417 ft	Deceleration Lane Length L_D	441	L_{down} =	ft
V_u =	1250 veh/h	Freeway Volume, V_F	2470	V_D =	veh/h
		Ramp Volume, V_R	200		
		Freeway Free-Flow Speed, S_{FF}	73.6		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2470	0.96	Level	39	0	0.837	0.95	3236
Ramp	200	0.96	Rolling	22	0	0.752	0.95	292
UpStream	1250	0.96	Level	5	0	0.976	0.95	1405
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3236 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3236	Exhibit 13-8	4800	No
$V_{FO} = V_F - V_R$	2944	Exhibit 13-8	4800	No
V_R	292	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3236	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.519 (Exhibit 13-12)

S_R= 57.2 mph (Exhibit 13-12)

S_0= N/A mph (Exhibit 13-12)

S = 57.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 1295	L_{down} = 5288 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 600 veh/h
	Freeway Volume, V_F: 3150	
	Ramp Volume, V_R: 1900	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3150	0.96	Level	18	0	0.917	0.95	3765
Ramp	1900	0.96	Rolling	1	0	0.985	0.95	2115
UpStream								
DownStream	600	0.96	Level	38	0	0.840	0.95	783

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 3155.16 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 2311 pc/h

V_3 or V_{av34} 1454 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5880	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4426	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 30.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.518 (Exibit 13-11)

S_R = 56.3 mph (Exhibit 13-11)

S_0 = 68.3 mph (Exhibit 13-11)

S = 58.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway/Ramp		Downstream Adj Ramp	
☐ Yes	☐ On	Freeway Number of Lanes, N	3	☑ Yes	☐ On
☑ No	☐ Off	Ramp Number of Lanes, N	1	☐ No	☑ Off
L_{up} =	ft	Acceleration Lane Length, L_A	1295	L_{down} =	5288 ft
V_u =	veh/h	Deceleration Lane Length L_D		V_D =	450 veh/h
		Freeway Volume, V_F	2770		
		Ramp Volume, V_R	1700		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2770	0.96	Level	29	0	0.873	0.95	3478
Ramp	1700	0.96	Rolling	3	0	0.957	0.95	1948
UpStream								
DownStream	450	0.96	Level	36	0	0.847	0.95	582

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2345.21 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 2135 pc/h

V_3 or V_{av34} = 1343 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5426	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4083	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.423 (Exibit 13-11)

S_R = 59.1 mph (Exhibit 13-11)

S_0 = 68.7 mph (Exhibit 13-11)

S = 61.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2584 ft

V_u = 350 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1295
Deceleration Lane Length L_D	
Freeway Volume, V_F	3150
Ramp Volume, V_R	1900
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3150	0.96	Level	18	0	0.917	0.95	3765
Ramp	1900	0.96	Rolling	1	0	0.985	0.95	2115
UpStream	350	0.96	Rolling	0	0	1.000	0.95	384
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2046.30 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 2311 pc/h

V_3 or V_{av34} 1454 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5880	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4426	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 30.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.518 (Exibit 13-11)

S_R = 56.3 mph (Exhibit 13-11)

S_0 = 68.3 mph (Exhibit 13-11)

S = 58.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2584 ft

V_u = 750 veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	1295
Deceleration Lane Length L_D	
Freeway Volume, V_F	2770
Ramp Volume, V_R	1700
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2770	0.96	Level	29	0	0.873	0.95	3478
Ramp	1700	0.96	Rolling	3	0	0.957	0.95	1948
UpStream	750	0.96	Rolling	2	0	0.971	0.95	847
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1949.14 (Equation 13-6 or 13-7)

P_{FM} = 0.614 using Equation (Exhibit 13-6)

V_{12} = 2135 pc/h

V_3 or V_{av34} 1343 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5426	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4083	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.3 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.423 (Exibit 13-11)

S_R = 59.1 mph (Exhibit 13-11)

S_0 = 68.7 mph (Exhibit 13-11)

S = 61.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 904	L_{down} = 2250 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 1000 veh/h
	Freeway Volume, V_F: 4450	
	Ramp Volume, V_R: 1050	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4450	0.96	Level	9	0	0.957	0.95	5099
Ramp	1050	0.96	Level	8	0	0.962	0.95	1197
UpStream								
DownStream	1000	0.96	Level	1	0	0.995	0.95	1102

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 5341.01 (Equation 13-6 or 13-7)

P_{FM} = 0.677 using Equation (Exhibit 13-6)

V_{12} = 3454 pc/h

V_3 or V_{av34} 1645 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3454 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6296	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4651	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.5 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.639 (Exibit 13-11)

S_R= 52.7 mph (Exhibit 13-11)

S_0= 67.6 mph (Exhibit 13-11)

S = 55.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Site Information

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	904
Deceleration Lane Length L_D	
Freeway Volume, V_F	4020
Ramp Volume, V_R	920
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{down} = 2250 ft

V_D = 1100 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4020	0.96	Level	21	0	0.905	0.95	4871
Ramp	920	0.96	Level	3	0	0.985	0.95	1024
UpStream								
DownStream	1100	0.96	Level	1	0	0.995	0.95	1212

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 5874.14 (Equation 13-6 or 13-7)

P_{FM} = 0.690 using Equation (Exhibit 13-6)

V_{12} = 3362 pc/h

V_3 or V_{av34} 1509 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3362 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5895	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4386	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 33.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.544 (Exibit 13-11)

S_R= 55.5 mph (Exhibit 13-11)

S_0= 68.1 mph (Exhibit 13-11)

S = 58.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	904	☑ No	☐ Off
L_{up} =	6259 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	600 veh/h	Freeway Volume, V_F	4450	V_D =	veh/h
		Ramp Volume, V_R	1050		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4450	0.96	Level	9	0	0.957	0.95	5099
Ramp	1050	0.96	Level	8	0	0.962	0.95	1197
UpStream	600	0.96	Level	38	0	0.840	0.95	783
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1961.72 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 3074 pc/h

V_3 or V_{av34} 2025 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3074 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6296	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4271	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.510 (Exibit 13-11)

S_R= 56.6 mph (Exhibit 13-11)

S_0= 66.2 mph (Exhibit 13-11)

S = 59.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 EB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	904	☑ No	☐ Off
L_{up} =	6259 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	450 veh/h	Freeway Volume, V_F	4020	V_D =	veh/h
		Ramp Volume, V_R	920		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4020	0.96	Level	21	0	0.905	0.95	4871
Ramp	920	0.96	Level	3	0	0.985	0.95	1024
UpStream	450	0.96	Level	36	0	0.847	0.95	582
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1875.91 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 2936 pc/h

V_3 or V_{av34} 1935 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 2936 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5895	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3960	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.435 (Exibit 13-11)

S_R= 58.8 mph (Exhibit 13-11)

S_0= 66.5 mph (Exhibit 13-11)

S = 61.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*25*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.727*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1030*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.7*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3650*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1774*	pc/h/ln
S	*66.2*	mph
D = v_p / S	*26.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2200*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.735*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1094*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*15.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.752*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1969*	pc/h/ln
S	*63.1*	mph
D = v_p / S	*31.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1500*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*958*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*12.8*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 70 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1629*	pc/h/ln
S	*70.6*	mph
D = v_p / S	*23.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2250*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*24*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.893*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*921*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*13.2*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 67 / HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4350*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*22*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.901*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.00*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.2*	mph
FFS	*72.2*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1765*	pc/h/ln
S	*66.3*	mph
D = v_p / S	*26.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3000*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*16*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.926*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1184*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*16.9*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*South St Ramp/HWY 67-229 Ramp*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6050*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*15*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.930*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2377*	pc/h/ln
S	*53.9*	mph
D = v_p / S	*44.1*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*AM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*18*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.917*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1016*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.5*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*Mathew Trippett*	Highway/Direction of Travel	*I30 WB*
Agency or Company	*Bridgefarmer & Associates*	From/To	*SOUTH ST ON/OFF RAMPS*
Date Performed	*6/20/2014*	Jurisdiction	*Benton, AR*
Analysis Time Period	*PM*	Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5200*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.33*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*4.1*	mph
FFS	*71.3*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2062*	pc/h/ln
S	*61.4*	mph
D = v_p / S	*33.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*1600*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*32*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.862*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1018*	pc/h/ln
S	*75.0*	mph
D = v_p / S	*13.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*03/04/2015*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*SOUTHWEST OF HWY 70*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2600*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*33*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.858*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD	*0.67*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*2.3*	mph
FFS	*73.1*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1661*	pc/h/ln
S	*70.2*	mph
D = v_p / S	*23.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 5 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2550*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*19*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.913*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1021*	pc/h/ln
S	*70.0*	mph
D = v_p / S	*14.6*	pc/mi/ln
LOS	*B*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*Mathew Trippett*
Agency or Company	*Bridgefarmer & Associates*
Date Performed	*6/20/2014*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*I30 WB*
From/To	*HWY 5 ON/OFF RAMPS*
Jurisdiction	*Benton, AR*
Analysis Year	*2038*

Project Description *CA0601*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4950*	veh/h	Peak-Hour Factor, PHF	*0.96*
AADT		veh/day	%Trucks and Buses, P_T	*17*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*0.95*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.922*

Speed Inputs

Lane Width	*12.0*	ft
Rt-Side Lat. Clearance	*6.0*	ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD	*1.17*	ramps/mi
FFS (measured)		mph
Base free-flow Speed, BFFS	*75.4*	mph

Calc Speed Adj and FFS

f_{LW}	*0.0*	mph
f_{LC}	*0.0*	mph
TRD Adjustment	*3.7*	mph
FFS	*71.7*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1963*	pc/h/ln
S	*63.2*	mph
D = v_p / S	*31.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	2	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	990	L_{down} =	2577 ft
V_u =	veh/h	Freeway Volume, V_F	3000	V_D =	150 veh/h
		Ramp Volume, V_R	950		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	40.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	950	0.96	Level	6	0	0.971	0.95	1073
UpStream								
DownStream	150	0.96	Rolling	0	0	1.000	0.95	164

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 2189 pc/h

V_3 or V_{av34} 1364 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2480	Exhibit 13-8	7200	No
V_R	1073	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2189	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 5.3 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.460 (Exhibit 13-12)

S_R= 58.1 mph (Exhibit 13-12)

S_0= 77.2 mph (Exhibit 13-12)

S = 64.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Freeway Number of Lanes, N	3
Ramp Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	990
Freeway Volume, V_F	6050
Ramp Volume, V_R	2400
Freeway Free-Flow Speed, S_{FF}	71.7
Ramp Free-Flow Speed, S_{FR}	40.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 2577 ft
V_D = 400 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6050	0.96	Level	15	0	0.930	0.95	7131
Ramp	2400	0.96	Level	2	0	0.990	0.95	2658
UpStream								
DownStream	400	0.96	Rolling	1	0	0.985	0.95	445

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R= mph (Exhibit 13-11)
S_0= mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 0.450 using Equation (Exhibit 13-7)
V_{12} = 4671 pc/h
V_3 or V_{av34} 2460 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7131	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4473	Exhibit 13-8	7200	No
V_R	2658	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4671	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.6 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.602 (Exhibit 13-12)
S_R= 53.8 mph (Exhibit 13-12)
S_0= 73.0 mph (Exhibit 13-12)
S = 59.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	2	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	4637 ft	Deceleration Lane Length L_D	990	L_{down} =	ft
V_u =	450 veh/h	Freeway Volume, V_F	3000	V_D =	veh/h
		Ramp Volume, V_R	950		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	40.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	950	0.96	Level	6	0	0.971	0.95	1073
UpStream	450	0.96	Level	3	0	0.985	0.95	501
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 2189 pc/h

V_3 or V_{av34} 1364 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	2480	Exhibit 13-8	7200	No
V_R	1073	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2189	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 5.3 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_s = 0.460 (Exhibit 13-12)

S_R= 58.1 mph (Exhibit 13-12)

S_0= 77.2 mph (Exhibit 13-12)

S = 64.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	2	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	4637 ft	Deceleration Lane Length L_D	990	L_{down} =	ft
V_u =	850 veh/h	Freeway Volume, V_F	6050	V_D =	veh/h
		Ramp Volume, V_R	2400		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	40.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	6050	0.96	Level	15	0	0.930	0.95	7131
Ramp	2400	0.96	Level	2	0	0.990	0.95	2658
UpStream	850	0.96	Level	3	0	0.985	0.95	946
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.450 using Equation (Exhibit 13-7)

V_{12} = 4671 pc/h

V_3 or V_{av34} 2460 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	7131	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	4473	Exhibit 13-8	7200	No
V_R	2658	Exhibit 13-10	4200	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4671	Exhibit 13-8	4400:All	Yes

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 26.6 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.602 (Exhibit 13-12)

S_R= 53.8 mph (Exhibit 13-12)

S_0= 73.0 mph (Exhibit 13-12)

S = 59.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A		☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D	153	L_{down} =	5630 ft
V_u =	veh/h	Freeway Volume, V_F	3000	V_D =	450 veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	450	0.96	Level	6	0	0.971	0.95	508
UpStream								
DownStream	450	0.96	Level	3	0	0.985	0.95	501

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.648 using Equation (Exhibit 13-7)

V_{12} = 2481 pc/h

V_3 or V_{av34} 1072 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3045	Exhibit 13-8	7200	No
V_R	508	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2481	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.279 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☑ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☐ Off
L_{up} = ft	Acceleration Lane Length, L_A:	L_{down} = 5630 ft
V_u = veh/h	Deceleration Lane Length L_D: 153	V_D = 850 veh/h
	Freeway Volume, V_F: 5700	
	Ramp Volume, V_R: 500	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5700	0.96	Level	15	0	0.930	0.95	6719
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream								
DownStream	850	0.96	Level	3	0	0.985	0.95	946

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.566 using Equation (Exhibit 13-7)

V_{12} = 4047 pc/h

V_3 or V_{av34} 2672 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6719	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	6163	Exhibit 13-8	7200	No
V_R	556	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4047	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 37.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.283 (Exhibit 13-12)

S_R= 63.3 mph (Exhibit 13-12)

S_0= 72.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	450 veh/h	Freeway Volume, V_F	3000	V_D =	veh/h
		Ramp Volume, V_R	450		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3000	0.96	Level	16	0	0.926	0.95	3553
Ramp	450	0.96	Level	6	0	0.971	0.95	508
UpStream	450	0.96	Level	1	0	0.995	0.95	496
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 4346.64 (Equation 13-12 or 13-13)

P_{FD} = 0.648 using Equation (Exhibit 13-7)

V_{12} = 2481 pc/h

V_3 or V_{av34} 1072 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3553	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	3045	Exhibit 13-8	7200	No
V_R	508	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	2481	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 24.2 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.279 (Exhibit 13-12)

S_R= 63.4 mph (Exhibit 13-12)

S_0= 78.4 mph (Exhibit 13-12)

S = 67.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SEVIER ST OFF RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☑ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☐ Off	Acceleration Lane Length, L_A		☑ No	☐ Off
L_{up} =	1634 ft	Deceleration Lane Length L_D	153	L_{down} =	ft
V_u =	750 veh/h	Freeway Volume, V_F	5700	V_D =	veh/h
		Ramp Volume, V_R	500		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5700	0.96	Level	15	0	0.930	0.95	6719
Ramp	500	0.96	Level	3	0	0.985	0.95	556
UpStream	750	0.96	Level	0	0	1.000	0.95	822
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R= mph (Exhibit 13-11)

S_0= mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = 4484.92 (Equation 13-12 or 13-13)

P_{FD} = 0.566 using Equation (Exhibit 13-7)

V_{12} = 4047 pc/h

V_3 or V_{av34} 2672 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	6719	Exhibit 13-8	7200	No
$V_{FO} = V_F - V_R$	6163	Exhibit 13-8	7200	No
V_R	556	Exhibit 13-10	2100	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4047	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 37.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.283 (Exhibit 13-12)

S_R= 63.3 mph (Exhibit 13-12)

S_0= 72.1 mph (Exhibit 13-12)

S = 66.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway/Ramp Inputs		Downstream Adj Ramp	
☐ Yes	☐ On	Freeway Number of Lanes, N	3	☑ Yes	☑ On
☑ No	☐ Off	Ramp Number of Lanes, N	1	☐ No	☐ Off
L_{up} =	ft	Acceleration Lane Length, L_A	1500	L_{down} =	1831 ft
V_u =	veh/h	Deceleration Lane Length L_D		V_D =	50 veh/h
		Freeway Volume, V_F	2050		
		Ramp Volume, V_R	150		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2050	0.96	Rolling	25	0	0.727	0.95	3091
Ramp	150	0.96	Rolling	0	0	1.000	0.95	164
UpStream								
DownStream	50	0.96	Rolling	0	0	1.000	0.95	55

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 1915 pc/h

V_3 or V_{av34} 1176 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1915 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3255	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2079	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.262 (Exibit 13-11)

S_R= 63.9 mph (Exhibit 13-11)

S_0= 69.3 mph (Exhibit 13-11)

S = 65.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Site Information

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☐ Yes	☐ On	Ramp Number of Lanes, N	1	☑ Yes	☑ On
☑ No	☐ Off	Acceleration Lane Length, L_A	1500	☐ No	☐ Off
L_{up} =	ft	Deceleration Lane Length L_D		L_{down} =	1831 ft
V_u =	veh/h	Freeway Volume, V_F	3650	V_D =	300 veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3650	0.96	Rolling	22	0	0.752	0.95	5323
Ramp	400	0.96	Rolling	1	0	0.985	0.95	445
UpStream								
DownStream	300	0.96	Rolling	1	0	0.985	0.95	334

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 3298 pc/h

V_3 or V_{av34} 2025 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3298 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5768	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3743	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.396 (Exibit 13-11)

S_R= 59.9 mph (Exhibit 13-11)

S_0= 66.2 mph (Exhibit 13-11)

S = 62.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	1500	☑ No	☐ Off
L_{up} =	2577 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	950 veh/h	Freeway Volume, V_F	2050	V_D =	veh/h
		Ramp Volume, V_R	150		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2050	0.96	Rolling	25	0	0.727	0.95	3091
Ramp	150	0.96	Rolling	0	0	1.000	0.95	164
UpStream	950	0.96	Level	6	0	0.971	0.95	1073
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 529.17 (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 1915 pc/h

V_3 or V_{av34} 1176 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1915 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3255	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2079	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.262 (Exibit 13-11)

S_R= 63.9 mph (Exhibit 13-11)

S_0= 69.3 mph (Exhibit 13-11)

S = 65.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 67 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	1500	☑ No	☐ Off
L_{up} =	2577 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	2400 veh/h	Freeway Volume, V_F	3650	V_D =	veh/h
		Ramp Volume, V_R	400		
		Freeway Free-Flow Speed, S_{FF}	71.7		
		Ramp Free-Flow Speed, S_{FR}	30.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3650	0.96	Rolling	22	0	0.752	0.95	5323
Ramp	400	0.96	Rolling	1	0	0.985	0.95	445
UpStream	2400	0.96	Level	2	0	0.990	0.95	2658
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1066.95 (Equation 13-6 or 13-7)

P_{FM} = 0.619 using Equation (Exhibit 13-6)

V_{12} = 3298 pc/h

V_3 or V_{av34} 2025 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3298 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	5768	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3743	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.1 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.396 (Exibit 13-11)

S_R= 59.9 mph (Exhibit 13-11)

S_0= 66.2 mph (Exhibit 13-11)

S = 62.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 986	L_{down} = 1634 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 450 veh/h
	Freeway Volume, V_F: 2550	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	19	0	0.913	0.95	3062
Ramp	450	0.96	Level	1	0	0.995	0.95	496
UpStream								
DownStream	450	0.96	Level	6	0	0.971	0.95	508

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2361.67 (Equation 13-6 or 13-7)

P_{FM} = 0.630 using Equation (Exhibit 13-6)

V_{12} = 1930 pc/h

V_3 or V_{av34} 1132 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 1930 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3558	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2426	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R= 63.8 mph (Exhibit 13-11)

S_0= 69.4 mph (Exhibit 13-11)

S = 65.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 5 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 986	L_{down} = 1634 ft
V_u = veh/h	Deceleration Lane Length L_D	V_D = 500 veh/h
	Freeway Volume, V_F: 4950	
	Ramp Volume, V_R: 750	
	Freeway Free-Flow Speed, S_{FF}: 71.7	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	4950	0.96	Level	17	0	0.922	0.95	5889
Ramp	750	0.96	Level	0	0	1.000	0.95	822
UpStream								
DownStream	500	0.96	Level	3	0	0.985	0.95	556

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2584.82 (Equation 13-6 or 13-7)

P_{FM} = 0.638 using Equation (Exhibit 13-6)

V_{12} = 3758 pc/h

V_3 or V_{av34} 2131 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☑ Yes ☐ No

If Yes,V_{12a} = 3758 pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	6711	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4580	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 34.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.603 (Exibit 13-11)

S_R= 53.8 mph (Exhibit 13-11)

S_0= 65.8 mph (Exhibit 13-11)

S = 57.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2962 ft

V_u = 750 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	1500
Ramp Volume, V_R	100
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1500	0.96	Level	33	0	0.858	0.95	1916
Ramp	100	0.96	Rolling	0	0	1.000	0.95	110
UpStream	750	0.96	Rolling	8	0	0.893	0.95	921
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1916 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	2026	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2026	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 15.7 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.263 (Exibit 13-11)

S_R = 64.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 64.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	HWY 70 ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp

☑ Yes ☐ On

☐ No ☑ Off

L_{up} = 2962 ft

V_u = 1800 veh/h

Freeway Number of Lanes, N	2
Ramp Number of Lanes, N	1
Acceleration Lane Length, L_A	880
Deceleration Lane Length L_D	
Freeway Volume, V_F	2550
Ramp Volume, V_R	50
Freeway Free-Flow Speed, S_{FF}	73.1
Ramp Free-Flow Speed, S_{FR}	50.0

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	33	0	0.858	0.95	3257
Ramp	50	0.96	Rolling	10	0	0.870	0.95	63
UpStream	1800	0.96	Rolling	1	0	0.985	0.95	2003
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3257 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3320	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3320	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.341 (Exibit 13-11)

S_R = 62.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 62.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 911	L_{down} = 4637 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 950 veh/h
	Freeway Volume, V_F: 2550	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	18	0	0.917	0.95	3048
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream								
DownStream	950	0.96	Level	6	0	0.971	0.95	1073

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 5181.65 (Equation 13-6 or 13-7)

P_{FM} = 0.610 using Equation (Exhibit 13-6)

V_{12} = 1858 pc/h

V_3 or V_{av34} 1190 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3549	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2359	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.271 (Exibit 13-11)

S_R = 63.4 mph (Exhibit 13-11)

S_0 = 68.8 mph (Exhibit 13-11)

S = 65.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Freeway Number of Lanes, N: 3	☑ Yes ☐ On
☑ No ☐ Off	Ramp Number of Lanes, N: 1	☐ No ☑ Off
L_{up} = ft	Acceleration Lane Length, L_A: 911	L_{down} = 4637 ft
V_u = veh/h	Deceleration Lane Length L_D:	V_D = 2400 veh/h
	Freeway Volume, V_F: 5200	
	Ramp Volume, V_R: 850	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5200	0.96	Level	17	0	0.922	0.95	6186
Ramp	850	0.96	Level	3	0	0.985	0.95	946
UpStream								
DownStream	2400	0.96	Level	2	0	0.990	0.95	2658

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 12835.80 (Equation 13-6 or 13-7)

P_{FM} = 0.699 using Equation (Exhibit 13-6)

V_{12} = 4326 pc/h

V_3 or V_{av34} 1860 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7132	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	5272	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 40.4 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.990 (Exibit 13-11)

S_R = 42.3 mph (Exhibit 13-11)

S_0 = 66.4 mph (Exhibit 13-11)

S = 46.7 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	AM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Freeway Number of Lanes, N: 3	☐ Yes ☐ On
☐ No ☑ Off	Ramp Number of Lanes, N: 1	☑ No ☐ Off
L_{up} = 5630 ft	Acceleration Lane Length, L_A: 911	L_{down} = ft
V_u = 450 veh/h	Deceleration Lane Length L_D:	V_D = veh/h
	Freeway Volume, V_F: 2550	
	Ramp Volume, V_R: 450	
	Freeway Free-Flow Speed, S_{FF}: 71.3	
	Ramp Free-Flow Speed, S_{FR}: 50.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2550	0.96	Level	18	0	0.917	0.95	3048
Ramp	450	0.96	Level	3	0	0.985	0.95	501
UpStream	450	0.96	Level	6	0	0.971	0.95	508
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 1376.97 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 1838 pc/h

V_3 or V_{av34} 1210 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3549	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	2339	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 17.8 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.270 (Exibit 13-11)

S_R = 63.4 mph (Exhibit 13-11)

S_0 = 68.7 mph (Exhibit 13-11)

S = 65.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	Mathew Trippett	Freeway/Dir of Travel	I30 WB
Agency or Company	Bridgefarmer & Associates	Junction	SOUTH ST ON RAMP
Date Performed	6/20/2014	Jurisdiction	Benton, AR
Analysis Time Period	PM	Analysis Year	2038

Project Description CA0601

Inputs

Upstream Adj Ramp		Freeway Number of Lanes, N	3	Downstream Adj Ramp	
☑ Yes	☐ On	Ramp Number of Lanes, N	1	☐ Yes	☐ On
☐ No	☑ Off	Acceleration Lane Length, L_A	911	☑ No	☐ Off
L_{up} =	5630 ft	Deceleration Lane Length L_D		L_{down} =	ft
V_u =	500 veh/h	Freeway Volume, V_F	5200	V_D =	veh/h
		Ramp Volume, V_R	850		
		Freeway Free-Flow Speed, S_{FF}	71.3		
		Ramp Free-Flow Speed, S_{FR}	50.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	5200	0.96	Level	17	0	0.922	0.95	6186
Ramp	850	0.96	Level	3	0	0.985	0.95	946
UpStream	500	0.96	Level	3	0	0.985	0.95	556
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = 2143.73 (Equation 13-6 or 13-7)

P_{FM} = 0.603 using Equation (Exhibit 13-6)

V_{12} = 3730 pc/h

V_3 or V_{av34} 2456 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	7132	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4676	Exhibit 13-8	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 35.8 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.649 (Exibit 13-11)

S_R= 52.3 mph (Exhibit 13-11)

S_0= 63.8 mph (Exhibit 13-11)

S = 55.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes,V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R= mph (Exhibit 13-12)

S_0= mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Mathew Trippett
Agency/Company	Bridgefarmer & Assoc.
Date Performed	3/30/2015
Analysis Time Period	AM

Site Information

Freeway/Dir of Travel	WB
Weaving Segment Location	HWY 67 ON-RAMP/INSPECTION STA
Analysis Year	2038

Project Description CA0601

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1138ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	2200	0.96	24	0	1.5	1.2	0.893	0.95	2702
V_{RF}	50	0.96	0	0	1.5	1.2	1.000	0.95	55
V_{FR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{RR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{NW}	2702							V =	2757
V_W	55								
VR	0.020								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	55 lc/h
Interchange density, ID	0.6 int/mi	Weaving lane changes, LC_W	318 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	403 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	721 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	184

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	veh/h	Weaving intensity factor, W	0.158
Weaving segment capacity, c_w	veh/h	Weaving segment speed, S	66.2 mph
Weaving segment v/c ratio		Average weaving speed, S_W	62.5 mph
Weaving segment density, D	10.4 pc/mi/ln	Average non-weaving speed, S_{NW}	66.3 mph
Level of Service, LOS	B	Maximum weaving length, L_{MAX}	2780 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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FREEWAY WEAVING WORKSHEET

General Information

Analyst	Mathew Trippett
Agency/Company	Bridgefarmer & Assoc.
Date Performed	3/30/2015
Analysis Time Period	PM

Site Information

Freeway/Dir of Travel	WB
Weaving Segment Location	HWY 67 ON-RAMP/INSPECTION STA
Analysis Year	2038

Project Description CA0601

Inputs

Weaving configuration	One-Sided	Segment type	Freeway
Weaving number of lanes, N	4	Freeway minimum speed, S_{MIN}	15
Weaving segment length, L_S	1138ft	Freeway maximum capacity, C_{IFL}	2400
Freeway free-flow speed, FFS	70 mph	Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	f_p	v (pc/h)
V_{FF}	4050	0.96	22	0	1.5	1.2	0.901	0.95	4929
V_{RF}	300	0.96	1	0	1.5	1.2	0.995	0.95	331
V_{FR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{RR}	0	0.96	0	0	1.5	1.2	1.000	0.95	0
V_{NW}	4929							V =	5260
V_W	331								
VR	0.063								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	331 lc/h
Interchange density, ID	0.6 int/mi	Weaving lane changes, LC_W	594 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	862 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1456 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	337

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	4532 veh/h	Weaving intensity factor, W	0.275
Weaving segment capacity, c_w	7682 veh/h	Weaving segment speed, S	61.1 mph
Weaving segment v/c ratio	0.590	Average weaving speed, S_W	58.2 mph
Weaving segment density, D	21.5 pc/mi/ln	Average non-weaving speed, S_{NW}	61.3 mph
Level of Service, LOS	C	Maximum weaving length, L_{MAX}	3184 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	325	0	25	0	0	0	0	225	1100	800	800	0
Number	5	2	12				3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1750	0	1750				0	1667	1733	1733	1667	0
Adj Flow Rate, veh/h	339	0	0				0	234	886	833	833	0
Adj No. of Lanes	2	0	1				0	2	2	2	2	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0				0	5	1	1	5	0
Cap, veh/h	617	0	284				0	1091	893	955	2211	0
Arrive On Green	0.19	0.00	0.00				0.00	0.34	0.34	0.30	0.70	0.00
Sat Flow, veh/h	3233	0	1487				0	3250	2592	3201	3250	0
Grp Volume(v), veh/h	339	0	0				0	234	886	833	833	0
Grp Sat Flow(s),veh/h/ln	1617	0	1487				0	1583	1296	1601	1583	0
Q Serve(g_s), s	8.5	0.0	0.0				0.0	4.7	30.6	22.2	9.7	0.0
Cycle Q Clear(g_c), s	8.5	0.0	0.0				0.0	4.7	30.6	22.2	9.7	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	617	0	284				0	1091	893	955	2211	0
V/C Ratio(X)	0.55	0.00	0.00				0.00	0.21	0.99	0.87	0.38	0.00
Avail Cap(c_a), veh/h	617	0	284				0	1091	893	996	2252	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	32.9	0.0	0.0				0.0	20.9	29.4	30.0	5.6	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0				0.0	0.1	28.2	8.4	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	0.0	0.0				0.0	2.1	14.4	10.9	4.2	0.0
LnGrp Delay(d),s/veh	34.0	0.0	0.0				0.0	21.0	57.5	38.3	5.7	0.0
LnGrp LOS	C							C	E	D	A	
Approach Vol, veh/h		339						1120			1666	
Approach Delay, s/veh		34.0						49.9			22.0	
Approach LOS		C						D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		22.2		67.8			31.8	36.0
Change Period (Y+Rc), s		5.0		5.0			5.0	5.0
Max Green Setting (Gmax), s		16.0		64.0			28.0	31.0
Max Q Clear Time (g_c+I1), s		10.5		11.7			24.2	32.6
Green Ext Time (p_c), s		0.6		10.8			2.6	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	33.3
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	725	0	25	0	0	0	0	625	500	1200	1700	0
Number	5	2	12				3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1716	0	1716				0	1667	1699	1699	1667	0
Adj Flow Rate, veh/h	755	0	0				0	651	521	1250	1771	0
Adj No. of Lanes	2	0	1				0	2	2	2	2	0
Peak Hour Factor	0.96	0.96	0.96				0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	0	2				0	5	3	3	5	0
Cap, veh/h	781	0	359				0	717	576	1319	2161	0
Arrive On Green	0.25	0.00	0.00				0.00	0.23	0.23	0.42	0.68	0.00
Sat Flow, veh/h	3170	0	1458				0	3250	2542	3139	3250	0
Grp Volume(v), veh/h	755	0	0				0	651	521	1250	1771	0
Grp Sat Flow(s),veh/h/ln	1585	0	1458				0	1583	1271	1570	1583	0
Q Serve(g_s), s	33.0	0.0	0.0				0.0	28.0	27.9	53.7	56.4	0.0
Cycle Q Clear(g_c), s	33.0	0.0	0.0				0.0	28.0	27.9	53.7	56.4	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	781	0	359				0	717	576	1319	2161	0
V/C Ratio(X)	0.97	0.00	0.00				0.00	0.91	0.90	0.95	0.82	0.00
Avail Cap(c_a), veh/h	781	0	359				0	746	599	1323	2194	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	52.2	0.0	0.0				0.0	52.7	52.7	39.1	16.0	0.0
Incr Delay (d2), s/veh	24.4	0.0	0.0				0.0	14.6	16.9	14.2	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.1	0.0	0.0				0.0	13.7	11.1	25.9	25.1	0.0
LnGrp Delay(d),s/veh	76.6	0.0	0.0				0.0	67.3	69.6	53.3	18.6	0.0
LnGrp LOS	E							E	E	D	B	
Approach Vol, veh/h		755						1172			3021	
Approach Delay, s/veh		76.6						68.3			32.9	
Approach LOS		E						E			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		39.5		100.5			63.8	36.7
Change Period (Y+Rc), s		5.0		5.0			5.0	5.0
Max Green Setting (Gmax), s		33.0		97.0			59.0	33.0
Max Q Clear Time (g_c+I1), s		35.0		58.4			55.7	30.0
Green Ext Time (p_c), s		0.0		27.1			3.1	1.7

Intersection Summary	
HCM 2010 Ctrl Delay	48.0
HCM 2010 LOS	D

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	50	0	800	500	350	100	150	250	150	0	350	100
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	0	1667	1651	1651	1651	1667	1667	1750	0	1667	1667
Adj Flow Rate, veh/h	52	0	750	521	365	0	156	260	0	0	365	0
Adj No. of Lanes	1	0	2	2	2	1	2	2	1	0	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	0	5	6	6	6	5	5	0	0	5	5
Cap, veh/h	404	0	0	2025	976	437	429	848	398	0	468	209
Arrive On Green	0.25	0.00	0.00	0.62	0.31	0.00	0.06	0.27	0.00	0.00	0.15	0.00
Sat Flow, veh/h	1587	52		3050	3137	1403	3079	3167	1487	0	3250	1417
Grp Volume(v), veh/h	52	26.0		521	365	0	156	260	0	0	365	0
Grp Sat Flow(s),veh/h/ln	1587	C		1525	1568	1403	1540	1583	1487	0	1583	1417
Q Serve(g_s), s	2.3			2.4	8.2	0.0	3.7	5.9	0.0	0.0	10.0	0.0
Cycle Q Clear(g_c), s	2.3			2.4	8.2	0.0	3.7	5.9	0.0	0.0	10.0	0.0
Prop In Lane	1.00			1.00		1.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	404			2025	976	437	429	848	398	0	468	209
V/C Ratio(X)	0.13			0.26	0.37	0.00	0.36	0.31	0.00	0.00	0.78	0.00
Avail Cap(c_a), veh/h	404			2025	976	437	675	1196	562	0	563	252
HCM Platoon Ratio	1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00			1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	25.9			7.4	24.2	0.0	28.6	26.3	0.0	0.0	36.9	0.0
Incr Delay (d2), s/veh	0.1			0.1	1.1	0.0	0.5	0.2	0.0	0.0	5.8	0.0
Initial Q Delay(d3),s/veh	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0			2.6	3.7	0.0	1.6	2.6	0.0	0.0	4.7	0.0
LnGrp Delay(d),s/veh	26.0			7.5	25.3	0.0	29.2	26.5	0.0	0.0	42.7	0.0
LnGrp LOS	C			A	C		C	C			D	
Approach Vol, veh/h					886			416			365	
Approach Delay, s/veh					14.8			27.5			42.7	
Approach LOS					B			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5		7	8
Phs Duration (G+Y+Rc), s	27.9	33.0		29.1	60.9		10.8	18.3
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0		5.0	5.0
Max Green Setting (Gmax), s	13.0	28.0		34.0	13.0		13.0	16.0
Max Q Clear Time (g_c+I1), s	4.3	10.2		7.9	4.4		5.7	12.0
Green Ext Time (p_c), s	0.1	2.1		3.6	1.5		0.2	1.3

Intersection Summary		
HCM 2010 Ctrl Delay		24.1
HCM 2010 LOS		C

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	50	0	1200	1000	1000	400	400	550	400	0	1000	400
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1667	0	1667	1716	1716	1716	1667	1667	1733	0	1667	1667
Adj Flow Rate, veh/h	52	0	1094	1042	1042	0	417	573	0	0	1042	0
Adj No. of Lanes	1	0	2	2	2	1	2	2	1	0	2	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	0	5	2	2	2	5	5	1	0	5	5
Cap, veh/h	199	0	0	1515	1048	469	443	1515	705	0	1063	476
Arrive On Green	0.09	0.00	0.00	0.45	0.32	0.00	0.11	0.48	0.00	0.00	0.34	0.00
Sat Flow, veh/h	1587	52		3170	3260	1458	3079	3167	1473	0	3250	1417
Grp Volume(v), veh/h	52	58.3		1042	1042	0	417	573	0	0	1042	0
Grp Sat Flow(s),veh/h/ln	1587	E		1585	1630	1458	1540	1583	1473	0	1583	1417
Q Serve(g_s), s	0.0			31.9	44.6	0.0	13.6	16.1	0.0	0.0	45.6	0.0
Cycle Q Clear(g_c), s	0.0			31.9	44.6	0.0	13.6	16.1	0.0	0.0	45.6	0.0
Prop In Lane	1.00			1.00		1.00	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	199			1515	1048	469	443	1515	705	0	1063	476
V/C Ratio(X)	0.26			0.69	0.99	0.00	0.94	0.38	0.00	0.00	0.98	0.00
Avail Cap(c_a), veh/h	199			1515	1048	469	443	1515	705	0	1063	476
HCM Platoon Ratio	1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00			1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	57.6			29.7	47.4	0.0	39.4	23.2	0.0	0.0	46.0	0.0
Incr Delay (d2), s/veh	0.7			1.3	26.5	0.0	28.5	0.2	0.0	0.0	22.8	0.0
Initial Q Delay(d3),s/veh	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9			15.8	24.0	0.0	9.7	7.0	0.0	0.0	23.3	0.0
LnGrp Delay(d),s/veh	58.3			31.0	73.9	0.0	68.0	23.4	0.0	0.0	68.8	0.0
LnGrp LOS	E			C	E		E	C			E	
Approach Vol, veh/h					2084			990			1042	
Approach Delay, s/veh					52.5			42.2			68.8	
Approach LOS					D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5		7	8
Phs Duration (G+Y+Rc), s	18.0	50.0		72.0	68.0		20.0	52.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0		5.0	5.0
Max Green Setting (Gmax), s	13.0	45.0		67.0	13.0		15.0	47.0
Max Q Clear Time (g_c+I1), s	2.0	46.6		18.1	33.9		15.6	47.6
Green Ext Time (p_c), s	0.2	0.0		14.0	0.0		0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	54.2
HCM 2010 LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	20	1300	735	90	25	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	21	1354	766	94	26	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	766	0	-	0	1485	383
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	719	-
Critical Hdwy	4.2	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.25	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	824	-	-	-	112	607
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	436	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	824	-	-	-	109	607
Mov Cap-2 Maneuver	-	-	-	-	109	-
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	425	-

Approach	EB	WB	SE
HCM Control Delay, s	0.1	0	26.6
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	824	-	-	-	218
HCM Lane V/C Ratio	0.025	-	-	-	0.239
HCM Control Delay (s)	9.5	-	-	-	26.6
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.1	-	-	-	0.9

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SEL	SER
Vol, veh/h	20	1100	1575	150	25	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	Yield
Storage Length	0	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	21	1146	1641	156	26	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1641	0	-	0	2256	820
Stage 1	-	-	-	-	1641	-
Stage 2	-	-	-	-	615	-
Critical Hdwy	4.2	-	-	-	6.9	7
Critical Hdwy Stg 1	-	-	-	-	5.9	-
Critical Hdwy Stg 2	-	-	-	-	5.9	-
Follow-up Hdwy	2.25	-	-	-	3.55	3.35
Pot Cap-1 Maneuver	377	-	-	-	34	312
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	377	-	-	-	32	312
Mov Cap-2 Maneuver	-	-	-	-	32	-
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	466	-

Approach	EB	WB	SE
HCM Control Delay, s	0.3	0	168.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	377	-	-	-	64
HCM Lane V/C Ratio	0.055	-	-	-	0.814
HCM Control Delay (s)	15.1	-	-	-	168.9
HCM Lane LOS	C	-	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	3.7

Intersection	
Int Delay, s/veh	1.7

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	72	387	663	87	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	Free	-	None
Storage Length	0	150	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	8	8	5	5	5
Mvmt Flow	75	403	691	91	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	691	-	0	-
Stage 1	691	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	-	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	-	-	-
Pot Cap-1 Maneuver	355	0	-	0
Stage 1	430	0	-	0
Stage 2	-	0	-	0
Platoon blocked, %			-	
Mov Cap-1 Maneuver	355	-	-	-
Mov Cap-2 Maneuver	355	-	-	-
Stage 1	430	-	-	-
Stage 2	-	-	-	-

Approach	NB	NE
HCM Control Delay, s	17.8	0
HCM LOS	C	

Minor Lane/Major Mvmt	NET	NBLn1	NBLn2
Capacity (veh/h)	-	355	-
HCM Lane V/C Ratio	-	0.211	-
HCM Control Delay (s)	-	17.8	0
HCM Lane LOS	-	C	A
HCM 95th %tile Q(veh)	-	0.8	-

Intersection	
Int Delay, s/veh	2.4

Movement	NBL	NBR	NET	NER	SWL	SWT
Vol, veh/h	96	429	491	126	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	Free	-	None
Storage Length	0	150	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	3	3	5	5	5
Mvmt Flow	100	447	511	131	0	0

Major/Minor	Minor1		Major1	
Conflicting Flow All	511	-	0	-
Stage 1	511	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	7.15	-	-	-
Critical Hdwy Stg 1	6.15	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	3.545	-	-	-
Pot Cap-1 Maneuver	468	0	-	0
Stage 1	540	0	-	0
Stage 2	-	0	-	0
Platoon blocked, %			-	
Mov Cap-1 Maneuver	468	-	-	-
Mov Cap-2 Maneuver	468	-	-	-
Stage 1	540	-	-	-
Stage 2	-	-	-	-

Approach	NB	NE
HCM Control Delay, s	14.8	0
HCM LOS	B	

Minor Lane/Major Mvmt	NET	NBLn1	NBLn2
Capacity (veh/h)	-	468	-
HCM Lane V/C Ratio	-	0.214	-
HCM Control Delay (s)	-	14.8	0
HCM Lane LOS	-	B	A
HCM 95th %tile Q(veh)	-	0.8	-

Intersection	
Int Delay, s/veh	3.3

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	119	528	222	0	0	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	124	550	231	0	0	75

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	306	-	0	0	231	0
Stage 1	231	-	-	-	-	-
Stage 2	75	-	-	-	-	-
Critical Hdwy	6.45	-	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	-	-	-	2.245	-
Pot Cap-1 Maneuver	680	0	-	-	1319	-
Stage 1	800	0	-	-	-	-
Stage 2	940	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	680	-	-	-	1319	-
Mov Cap-2 Maneuver	680	-	-	-	-	-
Stage 1	800	-	-	-	-	-
Stage 2	940	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	11.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	680	-	1319	-
HCM Lane V/C Ratio	-	-	0.182	-	-	-
HCM Control Delay (s)	-	-	11.5	0	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.7	-	0	-

Intersection	
Int Delay, s/veh	2.9

Movement	NWL	NWR	NET	NER	SWL	SWT
Vol, veh/h	112	349	268	0	0	96
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Free	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	117	364	279	0	0	100

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	379	-	0	0	279	0
Stage 1	279	-	-	-	-	-
Stage 2	100	-	-	-	-	-
Critical Hdwy	6.45	-	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	-	-	-	2.245	-
Pot Cap-1 Maneuver	617	0	-	-	1267	-
Stage 1	761	0	-	-	-	-
Stage 2	917	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	617	-	-	-	1267	-
Mov Cap-2 Maneuver	617	-	-	-	-	-
Stage 1	761	-	-	-	-	-
Stage 2	917	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	12.2	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	NWLn2	SWL	SWT
Capacity (veh/h)	-	-	617	-	1267	-
HCM Lane V/C Ratio	-	-	0.189	-	-	-
HCM Control Delay (s)	-	-	12.2	0	0	-
HCM Lane LOS	-	-	B	A	A	-
HCM 95th %tile Q(veh)	-	-	0.7	-	0	-

Intersection	
Intersection Delay, s/veh	10
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	11	189	11	0	1	252	4	0	64	18	17
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	11	197	11	0	1	263	4	0	67	19	18
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.9	10.5	9.4
HCM LOS	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	5%	0%	75%
Vol Thru, %	18%	90%	98%	7%
Vol Right, %	17%	5%	2%	18%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	99	211	257	96
LT Vol	64	11	1	72
Through Vol	18	189	252	7
RT Vol	17	11	4	17
Lane Flow Rate	103	220	268	100
Geometry Grp	1	1	1	1
Degree of Util (X)	0.152	0.294	0.355	0.148
Departure Headway (Hd)	5.311	4.822	4.778	5.333
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	669	741	747	666
Service Time	3.393	2.887	2.839	3.415
HCM Lane V/C Ratio	0.154	0.297	0.359	0.15
HCM Control Delay	9.4	9.9	10.5	9.4
HCM Lane LOS	A	A	B	A
HCM 95th-tile Q	0.5	1.2	1.6	0.5

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	72	7	17
Peak Hour Factor	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5
Mvmt Flow	0	75	7	18
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	9.4
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	193	10	0	0	150	10	0	64	36	26
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	21	201	10	0	0	156	10	0	67	38	27
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.7	9	9.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	51%	9%	0%	77%
Vol Thru, %	29%	87%	94%	6%
Vol Right, %	21%	4%	6%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	126	223	160	53
LT Vol	64	20	0	41
Through Vol	36	193	150	3
RT Vol	26	10	10	9
Lane Flow Rate	131	232	167	55
Geometry Grp	1	1	1	1
Degree of Util (X)	0.181	0.3	0.217	0.079
Departure Headway (Hd)	4.969	4.644	4.691	5.152
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	719	771	763	692
Service Time	3.02	2.685	2.735	3.211
HCM Lane V/C Ratio	0.182	0.301	0.219	0.079
HCM Control Delay	9.1	9.7	9	8.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	1.3	0.8	0.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	41	3	9
Peak Hour Factor	0.96	0.96	0.96	0.96
Heavy Vehicles, %	5	5	5	5
Mvmt Flow	0	43	3	9
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.7
HCM LOS	A

Lane

Intersection	
Intersection Delay, s/veh	5.9
Intersection LOS	A

Approach	SE	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	355	568	881
Demand Flow Rate, veh/h	373	596	925
Vehicles Circulating, veh/h	197	0	596
Vehicles Exiting, veh/h	596	570	0
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	8.8	9.6	2.2
Approach LOS	A	A	A

Lane	Left	Left	Left	Bypass
Designated Moves	R	L	T	R
Assumed Moves	R	L	T	R
RT Channelized				Free
Lane Util	1.000	1.000	1.000	
Critical Headway, s	5.193	5.193	5.193	
Entry Flow, veh/h	373	596	197	728
Cap Entry Lane, veh/h	928	1130	623	1837
Entry HV Adj Factor	0.952	0.953	0.952	0.952
Flow Entry, veh/h	355	568	188	693
Cap Entry, veh/h	883	1077	593	1750
V/C Ratio	0.402	0.527	0.316	0.396
Control Delay, s/veh	8.8	9.6	10.4	0.0
LOS	A	A	B	A
95th %tile Queue, veh	2	3	1	2

Intersection	
Intersection Delay, s/veh	5.4
Intersection LOS	A

Approach	SE	NE	SW
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	471	291	881
Demand Flow Rate, veh/h	495	306	925
Vehicles Circulating, veh/h	218	0	306
Vehicles Exiting, veh/h	306	713	0
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	11.8	5.9	1.8
Approach LOS	B	A	A

Lane	Left	Left	Left	Bypass
Designated Moves	R	L	T	R
Assumed Moves	R	L	T	R
RT Channelized				Free
Lane Util	1.000	1.000	1.000	
Critical Headway, s	5.193	5.193	5.193	
Entry Flow, veh/h	495	306	218	707
Cap Entry Lane, veh/h	909	1130	832	1837
Entry HV Adj Factor	0.952	0.951	0.952	0.952
Flow Entry, veh/h	471	291	208	673
Cap Entry, veh/h	865	1075	792	1750
V/C Ratio	0.545	0.271	0.262	0.385
Control Delay, s/veh	11.8	5.9	7.5	0.0
LOS	B	A	A	A
95th %tile Queue, veh	3	1	1	2

1: W South St & Bell St. Performance by movement

Movement	WBL	WBT	WBR	SER	NEL	NER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Total Del/Veh (s)	0.4	0.0	0.4	1.4	2.3	1.1	0.9
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.0	0.2	1.5	0.1	0.1

1: W South St & Bell St. Performance by movement

Movement	WBL	WBR	SER	NEL	NER	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1
Total Del/Veh (s)	0.5	0.5	1.4	0.9	0.5	0.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	0.0	0.0	0.3	0.7	0.0	0.0

5: Ramp A/W South St Performance by movement

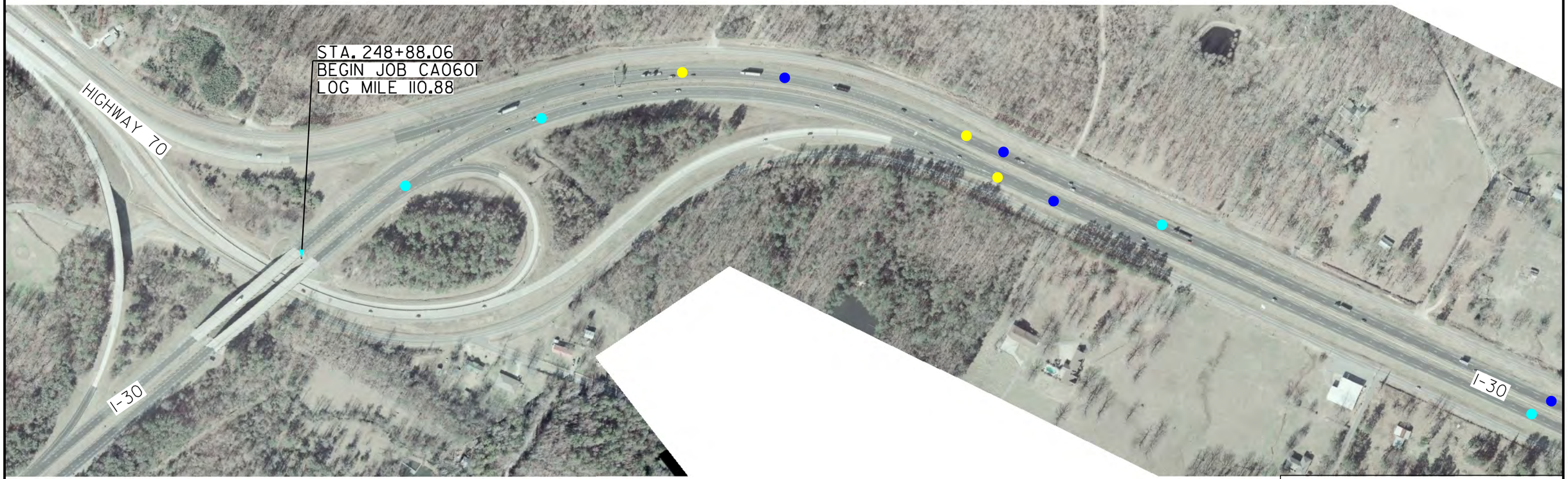
Movement	EBT	WBR	SEL	All
Denied Delay (hr)	0.0	0.1	0.0	0.1
Denied Del/Veh (s)	0.0	0.8	0.0	0.3
Total Delay (hr)	0.5	0.1	0.0	0.6
Total Del/Veh (s)	9.5	1.2	0.4	2.7
Stop Delay (hr)	0.3	0.0	0.0	0.3
Stop Del/Veh (s)	5.2	0.0	0.0	1.1

5: Ramp A/W South St Performance by movement

Movement	EBT	WBR	SEL	All
Denied Delay (hr)	0.0	0.2	0.0	0.2
Denied Del/Veh (s)	0.0	1.4	0.0	0.8
Total Delay (hr)	0.2	0.3	0.0	0.6
Total Del/Veh (s)	6.4	2.1	0.3	2.3
Stop Delay (hr)	0.1	0.0	0.0	0.1
Stop Del/Veh (s)	2.6	0.0	0.0	0.4

APPENDIX F – Crash Locations

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 CRASHES - 2010			



LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2010

N.T.S.

$FILE$

I-30 CRASHES - 2010
SHEET 1 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2010

SINGLE-VEHICLE FATALITY
07/11/2010

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2010

N.T.S.

$FILE$

B-505

I-30 CRASHES - 2010
SHEET 2 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2010

REAR-END FATALITY
07/13/2010

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2010

N.T.S.

$FILE$

I-30 CRASHES - 2010
SHEET 3 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 CRASHES - 2010			

LEGEND
- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2010

N.T.S.

$FILE$

B-507

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2010

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2010

N.T.S.

$FILE$

B-508

I-30 CRASHES - 2010
SHEET 5 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 CRASHES - 2011			

REAR-END FATALITY
06/11/2011

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2011

N.T.S.

I-30 CRASHES - 2011
SHEET 1 OF 5

S:\4407\01\DGN\Plans_Non-PS&E\Exhibits\Crash Sheets\4407_Crash_2011_01.dgn

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2011

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2011

N.T.S.

$FILE$

B-510

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 CRASHES - 2011			

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2011

N.T.S.

$FILE$

B-511

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2011

ANGLE FATALITY
08/11/2011

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2011

N.T.S.

$FILE$

B-512

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		
				(2)	I-30 CRASHES - 2011			

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2011

N.T.S.

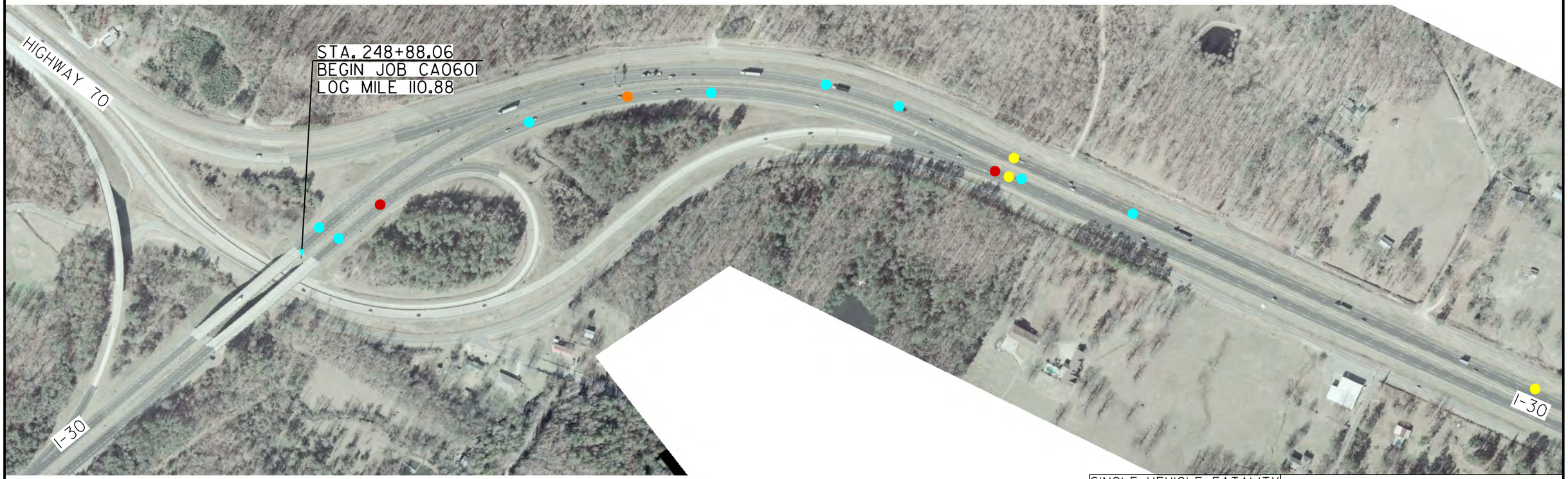
$FILE$

B-513

I-30 CRASHES - 2011
SHEET 5 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2012



SINGLE-VEHICLE FATALITY
10/06/2012

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2012

N.T.S.

$FILE$

I-30 CRASHES - 2012
SHEET 1 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2012

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2012

N.T.S.

$FILE$

B-515

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2012

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2012

N.T.S.

$FILE$

B-516

I-30 CRASHES - 2012
SHEET 3 OF 5

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2012

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2012

N.T.S.

$FILE$

DATE REVISED	DATE FILMED	DATE REVISED	DATE FILMED	FED.RD. DIST.NO.	STATE	FED.AID PROJ.NO.	SHEET NO.	TOTAL SHEETS
				6	ARK.			
				JOB NO.		CA0601		

(2) I-30 CRASHES - 2012

LEGEND

- REAR-END
- ANGLE
- SIDESWIPE
- SINGLE-VEHICLE
- HEAD-ON
- BACKING
- OTHER
- FATALITY

I-30 CRASHES

2012

N.T.S.

$FILE$

B-518

I-30 CRASHES - 2012
SHEET 5 OF 5

APPENDIX G – Environmental Constraints

Proposed Project Beginning

US Hwy 70

Liberty

Frontage Rd

I-30

Trace Creek

Pawnee Dr

Crossroads

Lantern St

Wingate Dr

Lily Dr

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N

1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 1 of 9
B-520

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

N

1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 2 of 9
B-521

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N

1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 3 of 9
B-522

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

Frontage Rd

US Hwy 70 I-30

Pawnee Dr

Dobbs Creek

UST Site

Rose Ln

State Hwy 229 US Hwy 67

Ashokan Dr

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

N

1:4,000

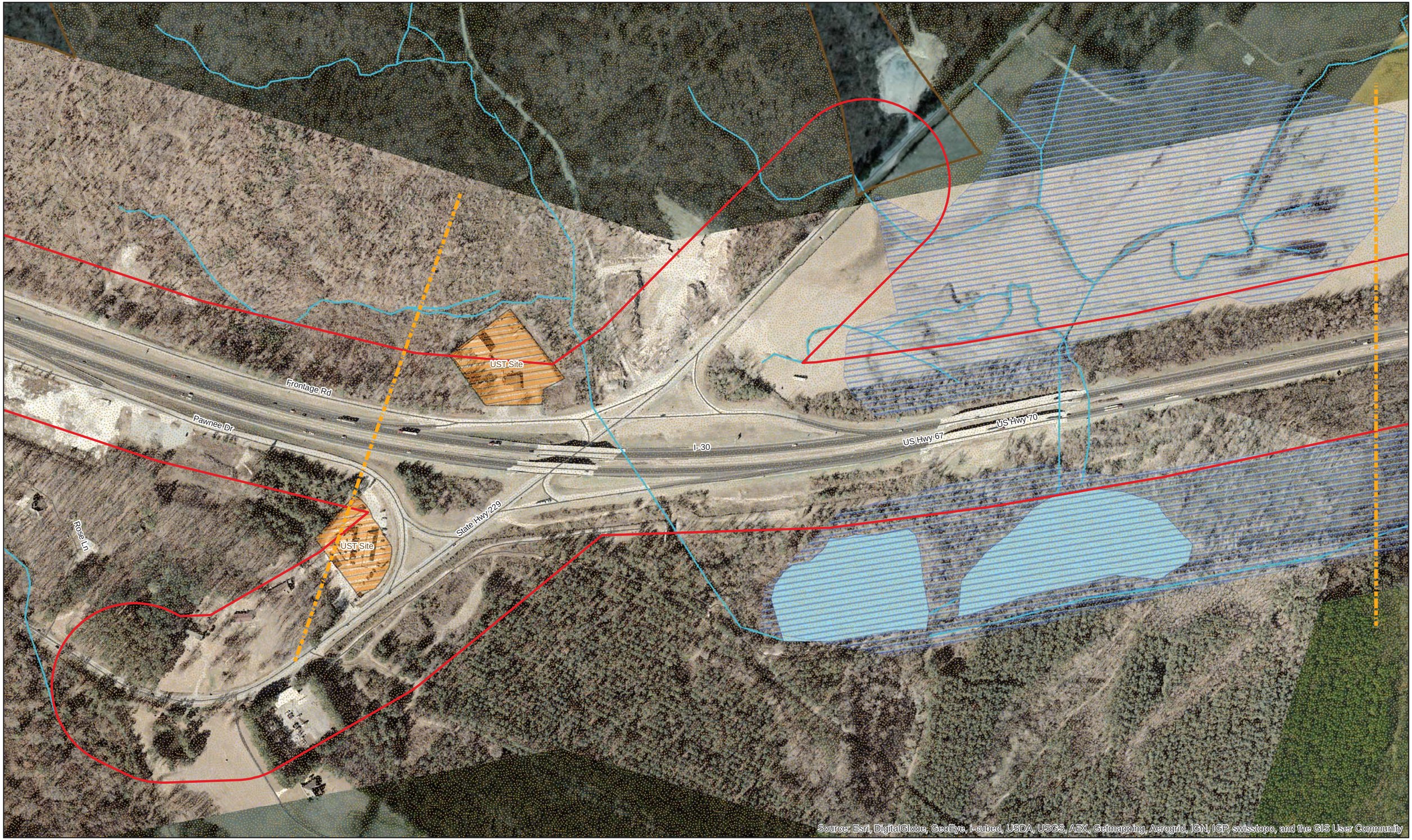
0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 4 of 9
B-523

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway



1:4,000

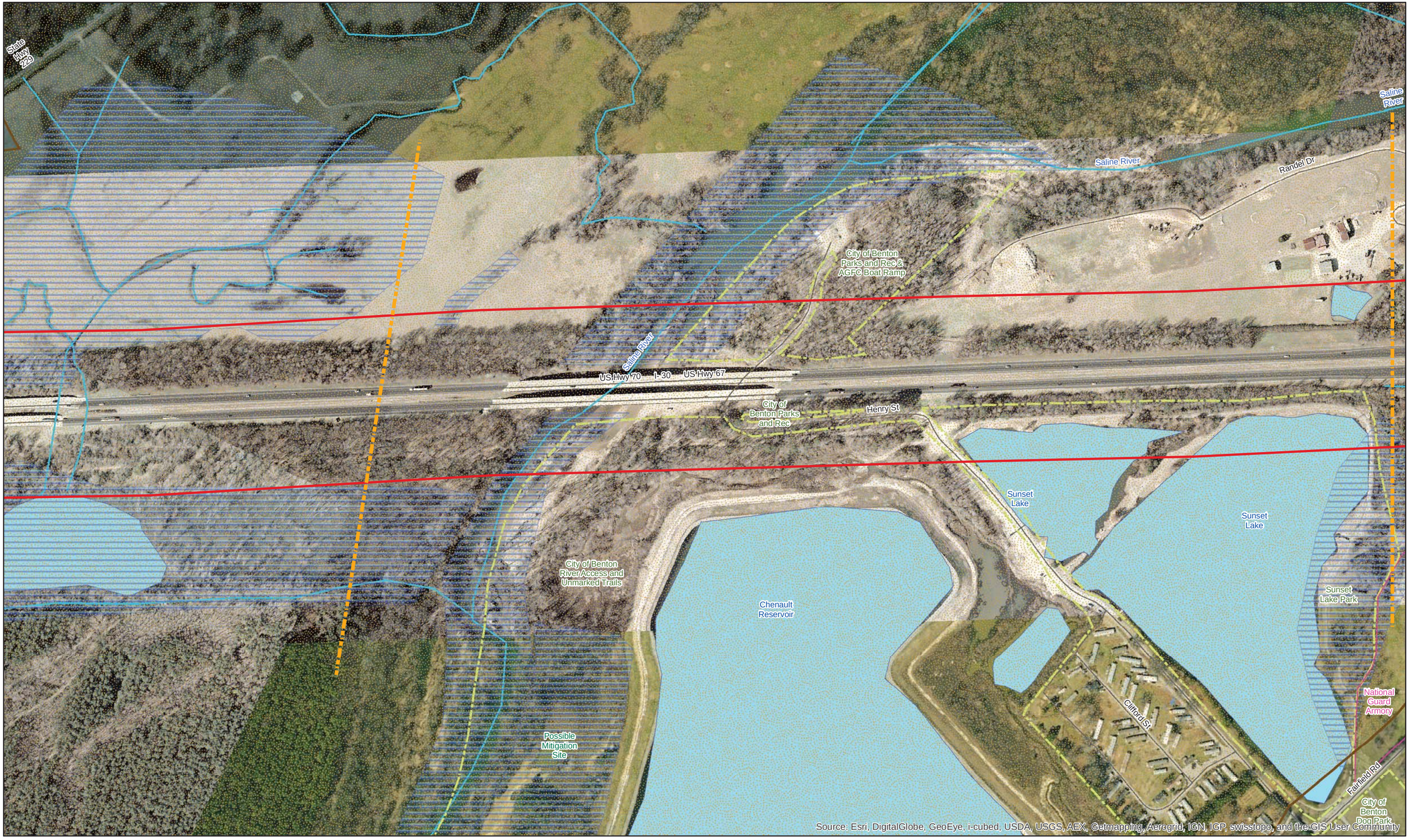
0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 5 of 9
B-524

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway



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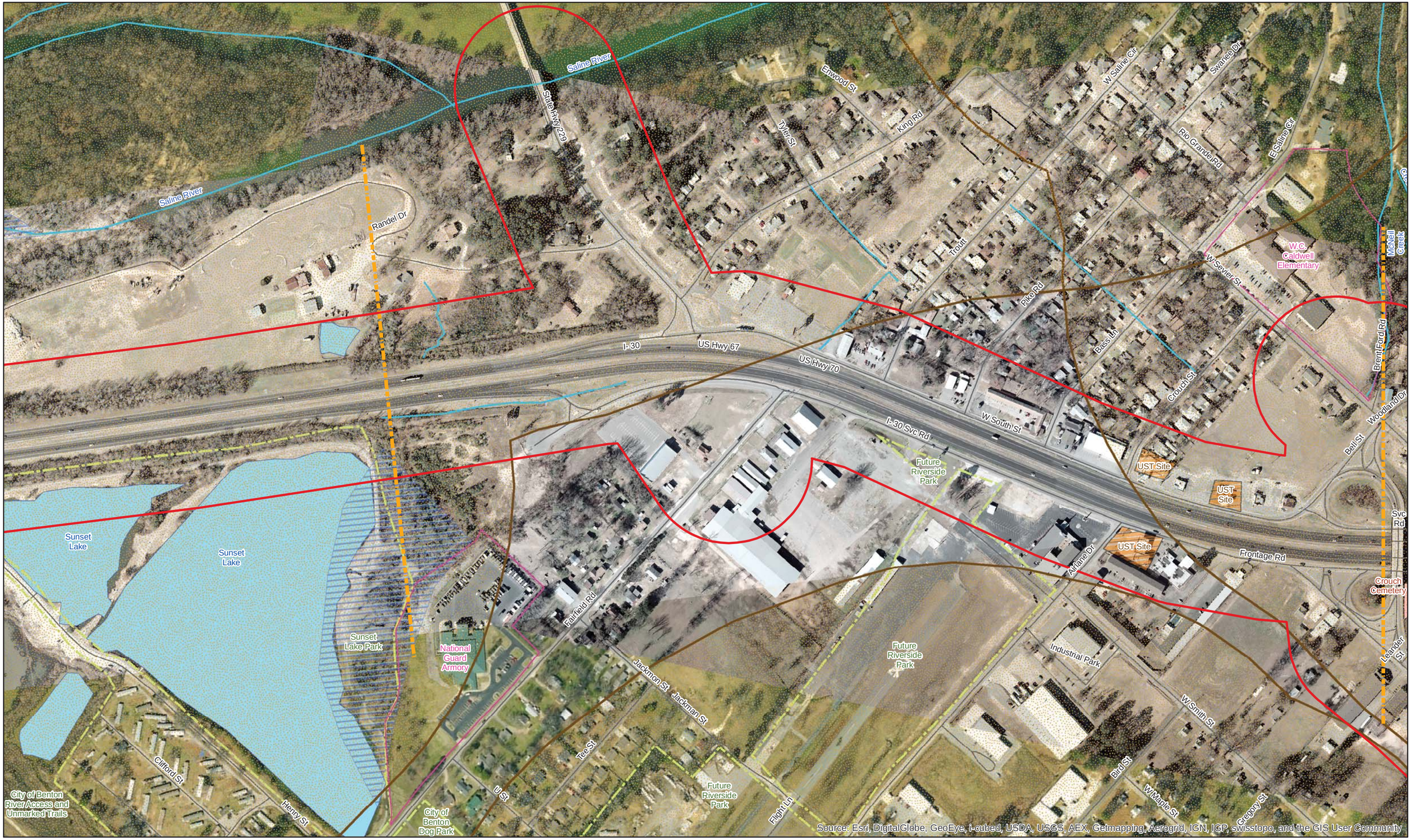
0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints
Figure 6 of 9
B-525

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway



1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints

Figure 7 of 9

B-526

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

N

1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints

Figure 8 of 9

B-527

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

N

1:4,000

0 310 620 930 1,240 Feet

AHTD Job CA0601
Preliminary Constraints

Figure 9 of 9

B-528

Not For Public Release

Legend

- Matchlines
- Constraints Survey Corridor
- Source Water Intake
- SWI Assessment Area
- Cultural Resources
- UST Sites
- Community Resources
- Section 4(f) Resources
- Potential Wetlands
- Open Waters
- Streams
- Roadway

APPENDIX H – Guide Sign Exhibits

PRELIMINARY

Working Copy Only
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Without Notice

SCOTT E. BENNETT, DIRECTOR

WIDENING OF I-30, SECTION 22

SALINE COUNTY, ARKANSAS

AHTD JOB NO. CA0601
FAP NO: 9991

NET LENGTH OF PROJECT = 5.35 MI

I-30: FROM LOG MILE 110.88
TO LOG MILE 116.23

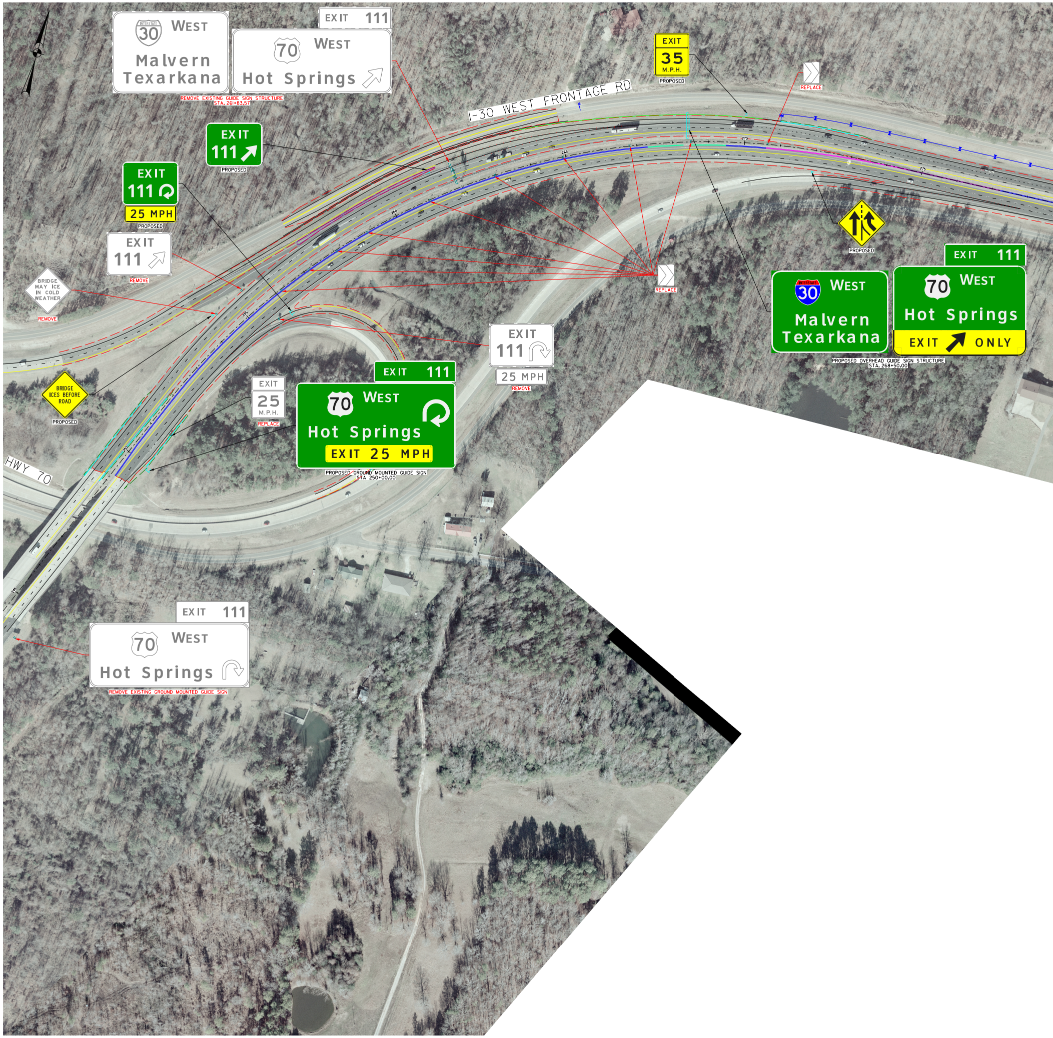
Saline County
HIGHWAY CLASSIFICATION
URBAN FREEWAY
September 2015

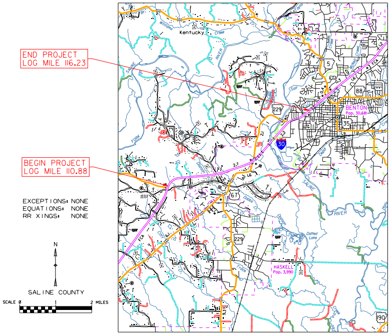
Design Speeds
MAINLANES - 70 MPH
RAMPS - 50 MPH DES. (40 MPH MIN.)
LOOP RAMPS - 20 MPH
FRONTAGE ROADS - 40 MPH
CROSS STREETS - 40 MPH
EXCEPTIONS ARE NOTED ON PLANS

Average Daily Traffic 2013 (2033)

I-30: 54,000 (74,000)

NOT A BIDDING DOCUMENT


200 0 200 400
SCALE: 1" = 200' HOR.
30 WEST
Malvern
Texarkana
EXIT 111
70 WEST
Hot Springs
REMOVE EXISTING GUIDE SIGN STRUCTURE
STA. 261+83.57
EXIT
35
M.P.H.
PROPOSED
REPLACE
I-30 WEST FRONTAGE RD
EXIT
111
PROPOSED
EXIT
111
25 MPH
PROPOSED
EXIT
111
REMOVE
BRIDGE
MAY ICE
IN COLD
WEATHER
REMOVE
REPLACE
PROPOSED
EXIT 111
30 WEST
Malvern
Texarkana
70 WEST
Hot Springs
EXIT ONLY
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE
STA. 268+50.00
EXIT
111
25 MPH
REMOVE
BRIDGE
ICES BEFORE
ROAD
PROPOSED
EXIT
25
M.P.H.
REPLACE
EXIT 111
70 WEST
Hot Springs
EXIT 25 MPH
PROPOSED GROUND MOUNTED GUIDE SIGN
STA 250+00.00
HWY 70
EXIT 111
70 WEST
Hot Springs
REMOVE EXISTING GROUND MOUNTED GUIDE SIGN


END PROJECT
LOG MILE 116.23
BEGIN PROJECT
LOG MILE 110.88
Kentucky
Williams
Creek
RIVER
SALINE
FORK
Salt
Creek
McNeil Creek
FCA
5
88
BENTON
Pop. 30,681
35
229
30
2.1
2.2
2.7
1.6
0.3
0.4
0.5
0.9
1.2
3.6
67
Dodson
Dobbs Cr.
SALINE
RIVER
Dotted Lake
Cliff
Trace
HASKELL
Pop. 3,990
229
9.3
190
Depot
N
SALINE COUNTY
SCALE 0 1 2 MILES

EXCEPTIONS: NONE
EQUATIONS: NONE
RR XINGS: NONE

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EXHIBIT 1

BRIDGEFARMER & ASSOCIATES, INC.

200 0 200 400
SCALE: 1" = 200' HOR.
Hot Springs National Park EXIT 111
REPLACE
I-30 EAST FRONTAGE RD
EXIT 111
70 WEST Hot Springs
EXIT ONLY
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE STA. 294+50.00
EXIT 111
70 WEST Hot Springs 1 MILE
REMOVE EXISTING GROUND MOUNTED SIGN
COMMERCIAL VEH INSPECTION STA 1 MILE
ALL TRUCKS MUST EXIT
REPLACE EXISTING GROUND MOUNTED SIGN
Benton 4
Little Rock 27
REPLACE EXISTING GROUND MOUNTED SIGN (FROM STA. 305+00.00)
SERVICE SIGN CAMPING EXIT 111 REPLACE
EXIT 111
70 WEST Hot Springs 1 MILE
EXIT ONLY
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE STA. 321+00.00
SERVICE SIGN ATTRACTION EXIT 111 REPLACE
COMMERCIAL VEH INSPECTION STA NEXT RIGHT
ALL TRUCKS MUST EXIT
REPLACE EXISTING GROUND MOUNTED SIGN
EXIT 114
67 SOUTH Arkansas Health Center 1 MILE
REMOVE EXISTING GROUND MOUNTED SIGN
INSPECTION STATION ↗
PROPOSED
EXIT 114
67 SOUTH Arkansas Health Center 1 MILE
PROPOSED GROUND MOUNTED GUIDE SIGN STA. 324+50.00

I-30 WEST FRONTAGE RD
I-30 EAST FRONTAGE RD
REPLACE
SPEED LIMIT 70
TRUCKS 65
REPLACE
INSPECTION STATION
PROPOSED
INSPECTION STATION
REPLACE EXISTING GROUND MOUNTED SIGN
RIGHT LANE MUST EXIT
PROPOSED
340
345
350
355
360
365
370
INSPECTION STATION
REMOVE EXISTING GROUND MOUNTED SIGN
INSPECTION STATION
PROPOSED
SERVICE SIGN
GAS/FOOD EXIT 114
REPLACE
PROPOSED
REMOVE
Haskell EXIT 114
REMOVE
Haskell EXIT 114
PROPOSED
EXIT 114
67 SOUTH
Arkansas Health Center
REMOVE EXISTING GROUND MOUNTED SIGN

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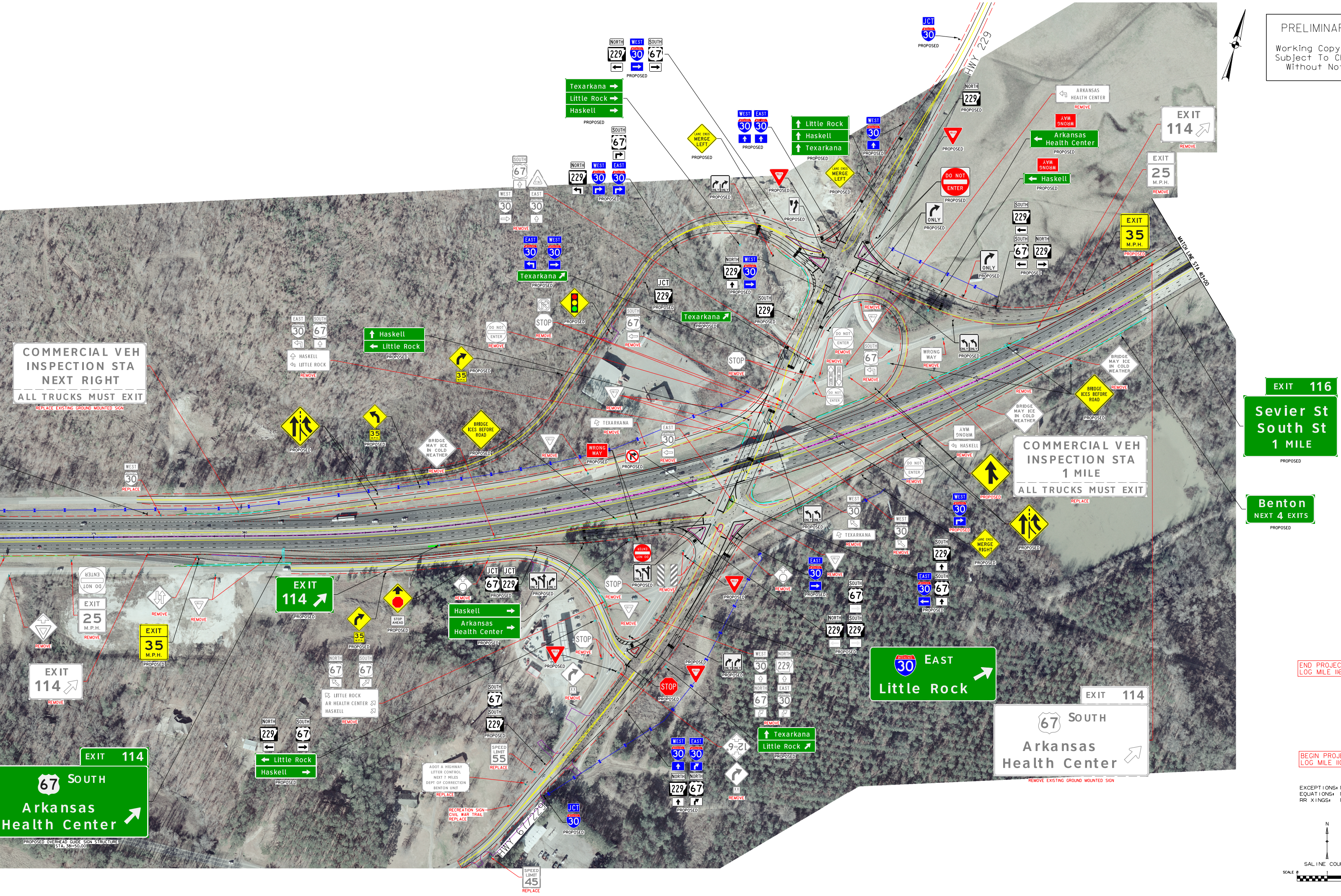


HWY 229
JCT 30 PROPOSED
NORTH 229 WEST 30 SOUTH 67 PROPOSED
Texarkana
Little Rock
Haskell
PROPOSED
LANE ENDS MERGE LEFT PROPOSED
Little Rock
Haskell
Texarkana
PROPOSED
ARKANSAS HEALTH CENTER REMOVE
WRONG WAY
Arkansas Health Center PROPOSED
DO NOT ENTER PROPOSED
ONLY PROPOSED
Haskell PROPOSED
EXIT 114 REMOVE
EXIT 25 M.P.H. REMOVE
EXIT 35 M.P.H. PROPOSED
MATCH LINE STA 401+00
COMMERCIAL VEH INSPECTION STA NEXT RIGHT
ALL TRUCKS MUST EXIT
REPLACE EXISTING GROUND MOUNTED SIGN
Haskell
Little Rock
PROPOSED
Texarkana PROPOSED
BRIDGE MAY ICE IN COLD WEATHER REMOVE
BRIDGE ICES BEFORE ROAD PROPOSED
STOP REMOVE
WRONG WAY PROPOSED
TEXARKANA REMOVE
COMMERCIAL VEH INSPECTION STA 1 MILE
ALL TRUCKS MUST EXIT
REPLACE
LANE ENDS MERGE RIGHT PROPOSED
EXIT 114 PROPOSED
EXIT 35 M.P.H. PROPOSED
EXIT 25 M.P.H. REMOVE
EXIT 114 REMOVE
Haskell
Arkansas Health Center
PROPOSED
LITTLE ROCK
AR HEALTH CENTER
HASKELL
REMOVE
STOP AHEAD PROPOSED
STOP PROPOSED
Little Rock
Haskell
PROPOSED
SPEED LIMIT 55 REPLACE
ADOT A HIGHWAY LITTER CONTROL NEXT 7 MILES DEPT OF CORRECTION BENTON UNIT REPLACE
RECREATION SIGN CIVIL WAR TRAIL REPLACE
Texarkana
Little Rock
PROPOSED
30 EAST Little Rock
EXIT 114
67 SOUTH Arkansas Health Center
REMOVE EXISTING GROUND MOUNTED SIGN
EXIT 114
67 SOUTH Arkansas Health Center
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE STA. 38+50.00
HWY 67/229
JCT 30 PROPOSED
SPEED LIMIT 45 REPLACE
EXIT 116
Sevier St
South St
1 MILE
PROPOSED
Benton
NEXT 4 EXITS
PROPOSED

200 0 200 400
SCALE: 1" = 200' HOR.

SCOTT E. BENNETT, DIRECTOR

WIDENING OF I-30, SECTION 22

SALINE COUNTY, ARKANSAS
AHTD JOB NO. CA0601
FAP NO: 9991
NET LENGTH OF PROJECT = 5.35 MI

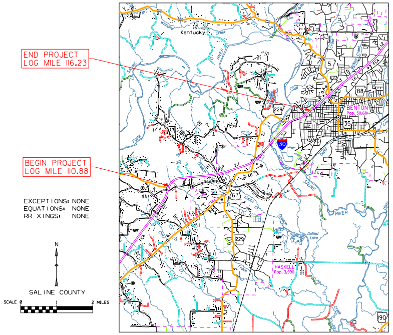
I-30: FROM LOG MILE 110.88
TO LOG MILE 116.23

Saline County
HIGHWAY CLASSIFICATION
URBAN FREEWAY
September 2015
Design Speeds
MAINLANES - 70 MPH
RAMPS - 50 MPH DES.(40 MPH MIN.)
LOOP RAMPS - 20 MPH
FRONTAGE ROADS - 40 MPH
CROSS STREETS - 40 MPH
EXCEPTIONS ARE NOTED ON PLANS

Average Daily Traffic 2013 (2033)

I-30: 54,000 (74,000)

NOT A BIDDING DOCUMENT



END PROJECT LOG MILE 116.23
BEGIN PROJECT LOG MILE 110.88
Kentucky
BENTON Pop. 30,681
HASKELL Pop. 3,990
N
SALINE COUNTY
SCALE 0 1 2 MILES

EXCEPTIONS: NONE
EQUATIONS: NONE
RR XINGS: NONE

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BRIDGEFARMER & ASSOCIATES, INC.

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SCOTT E. BENNETT, DIRECTOR

WIDENING OF I-30, SECTION 22

SALINE COUNTY, ARKANSAS

AHTD JOB NO. CA0601
FAP NO: 9991

NET LENGTH OF PROJECT = 5.35 MI

I-30: FROM LOG MILE 110.88
TO LOG MILE 116.23

Saline County
HIGHWAY CLASSIFICATION
URBAN FREEWAY
September 2015

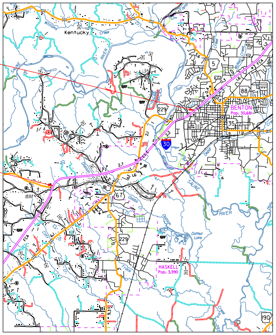
Design Speeds

MAINLANES - 70 MPH
RAMPS - 50 MPH DES. (40 MPH MIN.)
LOOP RAMPS - 20 MPH
FRONTAGE ROADS - 40 MPH
CROSS STREETS - 40 MPH
EXCEPTIONS ARE NOTED ON PLANS

Average Daily Traffic 2013 (2033)

I-30:	54,000	(74,000)

NOT A BIDDING DOCUMENT


Kentucky
SALINE
RIVER
FORK
BENTON Pop. 30,681
HASKELL Pop. 3,990
30
67
229
5
88
35
190
Dotted Lake
Saline River

END PROJECT
LOG MILE 116.23

BEGIN PROJECT
LOG MILE 110.88

EXCEPTIONS: NONE
EQUATIONS: NONE
RR XINGS: NONE

SALINE COUNTY
SCALE 0 1 2 MILES

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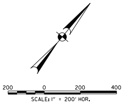
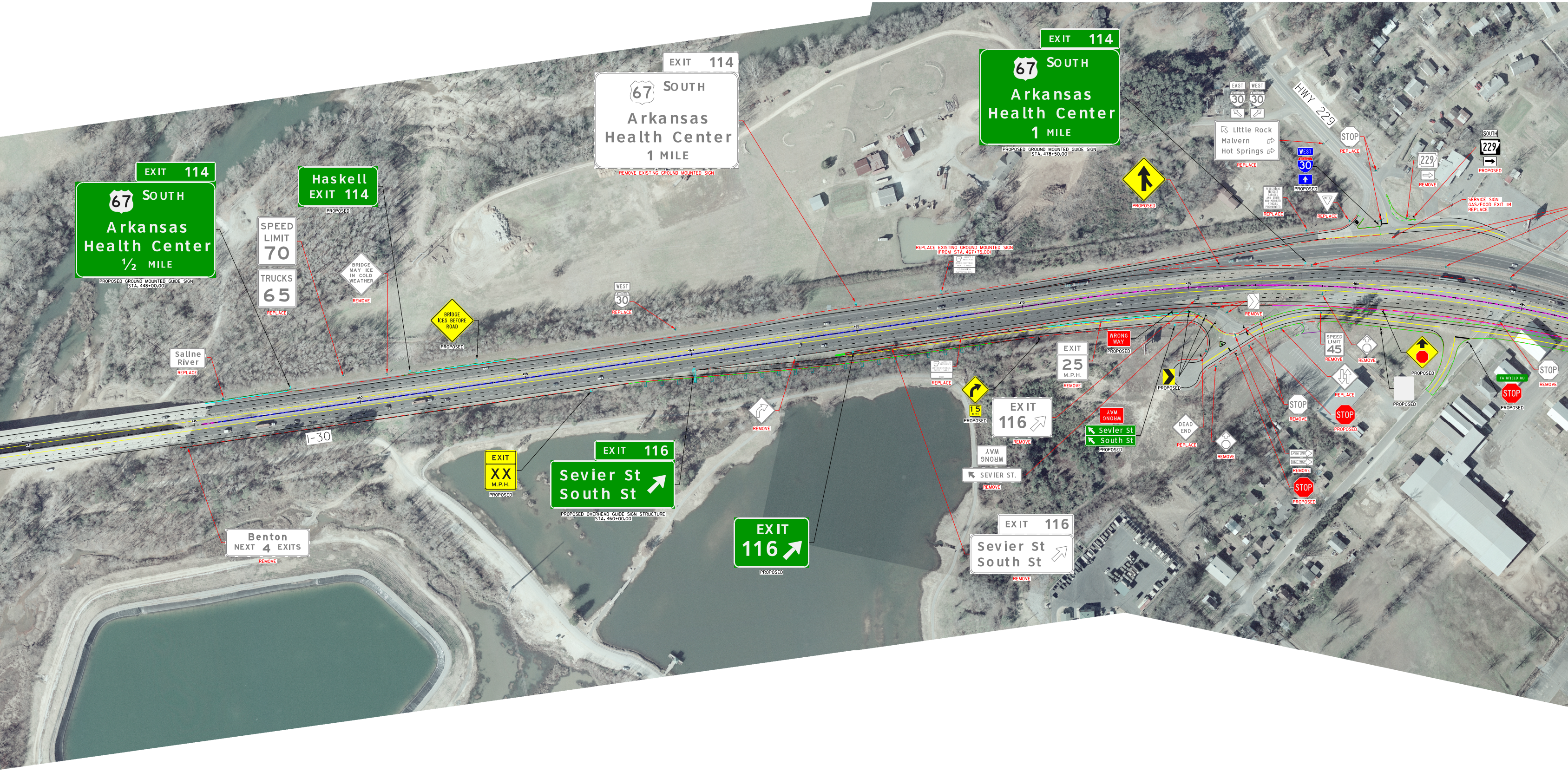
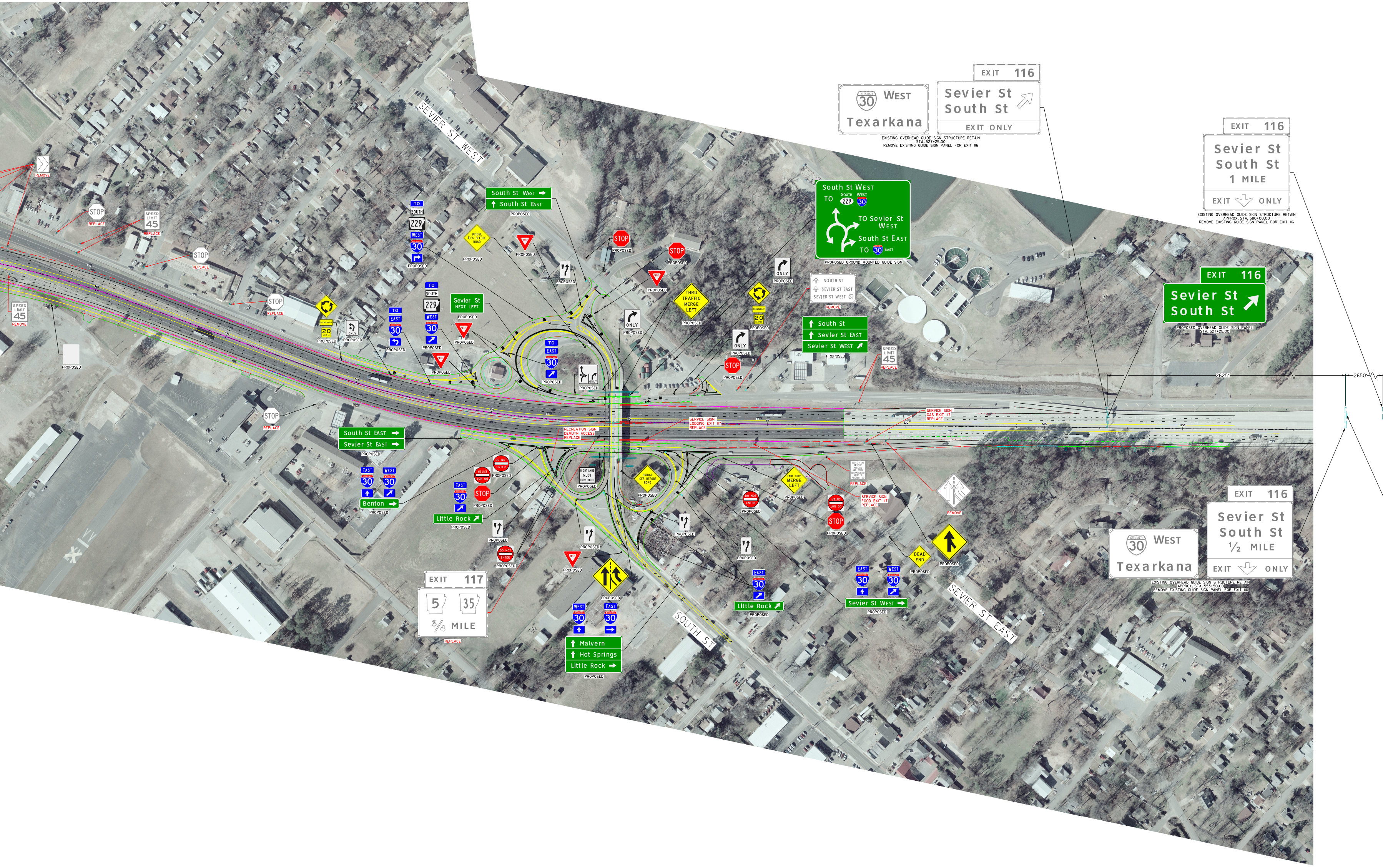
EXHIBIT 2

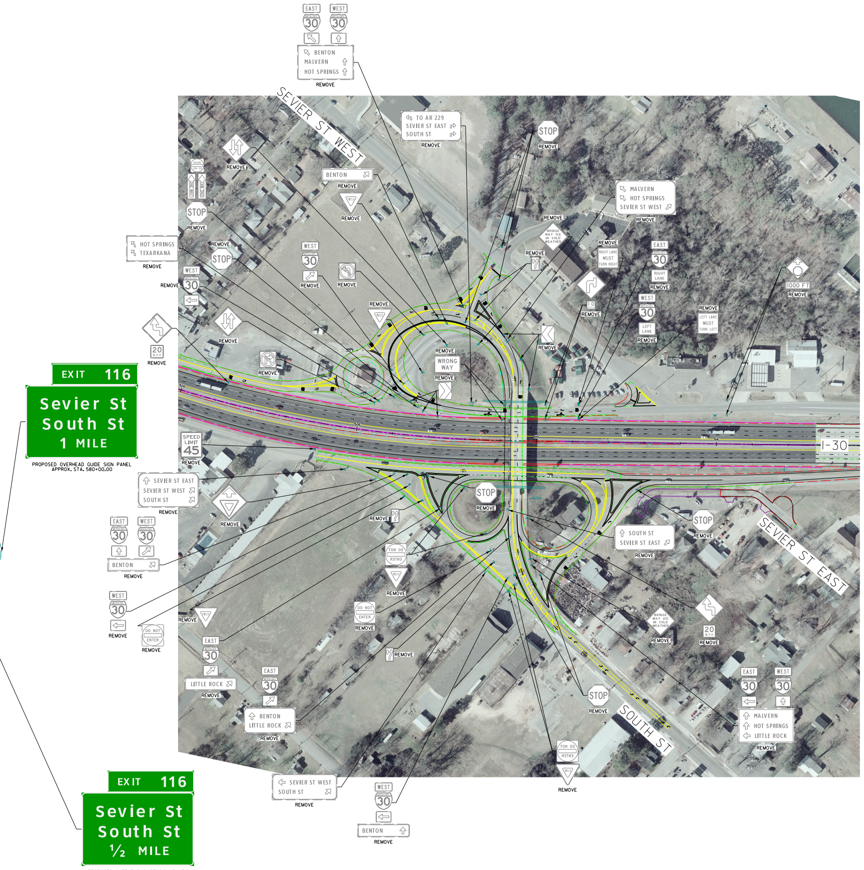
BRIDGEFARMER & ASSOCIATES, INC.


200 0 200 400
SCALE: 1" = 200' HOR.

MATCH LINE STA 413+00
420
425
430
435
EXIT 114
67 SOUTH
Arkansas Health Center
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE
STA. 325+37.00
EXIT 114
PROPOSED
BRIDGE MAY ICE IN COLD WEATHER
REMOVE
BRIDGE ICES BEFORE ROAD
PROPOSED
ONLY
PROPOSED
Haskell EXIT 114
REMOVE
ADOPT A HIGHWAY
LITTER CONTROL NEXT 1 MILE
REPLACE
SERVICE SIGN FOOD EXIT 116 REPLACE
Saline River
REPLACE
SERVICE SIGN GAS EXIT 116 REPLACE
BRIDGE MAY ICE IN COLD WEATHER
REMOVE
ADOPT A HIGHWAY
LITTER CONTROL NEXT 1 MILE
CELEBRATION BAPTIST CHURCH
REPLACE
SERVICE SIGN LODGING EXIT 116 REPLACE
SPEED LIMIT 70
TRUCKS 65
PROPOSED
BRIDGE ICES BEFORE ROAD
PROPOSED
SPEED LIMIT 70
TRUCKS 65
REMOVE
EXIT 116
Sevier St
South St
½ MILE
PROPOSED GROUND MOUNTED GUIDE SIGN
STA. 430+50.00

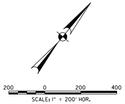

EXIT 114
67 SOUTH
Arkansas Health Center
½ MILE
PROPOSED GROUND MOUNTED GUIDE SIGN
STA. 448+00.00
Haskell EXIT 114
PROPOSED
SPEED LIMIT 70
TRUCKS 65
REPLACE
BRIDGE MAY ICE IN COLD WEATHER
REMOVE
Saline River
REPLACE
BRIDGE ICES BEFORE ROAD
PROPOSED
EXIT 114
67 SOUTH
Arkansas Health Center
1 MILE
REMOVE EXISTING GROUND MOUNTED SIGN
WEST 30
REPLACE
I-30
Benton NEXT 4 EXITS
REMOVE
EXIT XX M.P.H.
PROPOSED
EXIT 116
Sevier St South St
PROPOSED OVERHEAD GUIDE SIGN STRUCTURE
STA. 460+00.00
REMOVE
EXIT 116
PROPOSED
REPLACE EXISTING GROUND MOUNTED SIGN
(FROM STA. 467+75.00)
EXIT 114
67 SOUTH
Arkansas Health Center
1 MILE
PROPOSED GROUND MOUNTED GUIDE SIGN
STA. 478+50.00
PROPOSED
EAST 30
WEST 30
Little Rock
Malvern
Hot Springs
REPLACE
HWY 229
STOP
REPLACE
WEST 30
PROPOSED
REPLACE
REPLACE
229
REMOVE
SOUTH 229
PROPOSED
SERVICE SIGN
GAS/FOOD EXIT 114
REPLACE
REPLACE
15 MPH
PROPOSED
EXIT 25 M.P.H.
REMOVE
WRONG WAY
PROPOSED
EXIT 116
REMOVE
WRONG WAY
SEVIER ST.
REMOVE
WRONG WAY
Sevier St
South St
PROPOSED
PROPOSED
DEAD END
REPLACE
REMOVE
REMOVE
SPEED LIMIT 45
REMOVE
REMOVE
REPLACE
STOP
REMOVE
STOP
PROPOSED
ONE WAY
ONE WAY
REMOVE
STOP
PROPOSED
PROPOSED
PROPOSED
FAIRFIELD RD
STOP
PROPOSED
STOP
REMOVE
EXIT 116
Sevier St South St
REMOVE


SEVIER ST WEST
SOUTH ST
SEVIER ST EAST
EXIT 116
30 WEST
Texarkana
Sevier St
South St
EXIT ONLY
EXISTING OVERHEAD GUIDE SIGN STRUCTURE RETAIN
STA. 527+25.00
REMOVE EXISTING GUIDE SIGN PANEL FOR EXIT 116
EXIT 116
Sevier St
South St
1 MILE
EXIT ONLY
EXISTING OVERHEAD GUIDE SIGN STRUCTURE RETAIN
APPROX. STA. 580+00.00
REMOVE EXISTING GUIDE SIGN PANEL FOR EXIT 116
South St WEST
TO SOUTH 229 WEST 30
TO Sevier St WEST
South St EAST
TO 30 EAST
PROPOSED GROUND MOUNTED GUIDE SIGN
ONLY
PROPOSED
SOUTH ST
SEVIER ST EAST
SEVIER ST WEST
REMOVE
South St
Sevier St EAST
Sevier St WEST
PROPOSED
SPEED LIMIT 45
REPLACE
EXIT 116
Sevier St
South St
PROPOSED OVERHEAD GUIDE SIGN PANEL
STA. 527+25.00
South St WEST
South St EAST
PROPOSED
TO SOUTH 229
WEST 30
BRIDGE ICES BEFORE ROAD
STOP
THRU TRAFFIC MERGE LEFT
20 M.P.H.
Sevier St NEXT LEFT
TO EAST 30
STOP
REPLACE
SPEED LIMIT 45
REMOVE
PROPOSED
SERVICE SIGN
LODGING EXIT 117
REPLACE
SERVICE SIGN
GAS EXIT 117
REPLACE
RECREATION SIGN
DEMUTH ACCESS
REPLACE
2625'
2650'
South St EAST
Sevier St EAST
EAST 30
WEST 30
Benton
DO NOT ENTER
WRONG WAY
RIGHT LANE MUST TURN RIGHT
LANE ENDS MERGE LEFT
PEDESTRIANS BICYCLES PARADES AND OTHER NON-MOTORIZED VEHICLES PROHIBITED
SERVICE SIGN
FOOD EXIT 117
REPLACE
Little Rock
EXIT 117
5 35
3/4 MILE
DEAD END
EAST 30
WEST 30
Malvern
Hot Springs
Little Rock
Sevier St West
SOUTH ST
SEVIER ST EAST
EXIT 116
30 WEST
Texarkana
Sevier St
South St
1/2 MILE
EXIT ONLY
EXISTING OVERHEAD GUIDE SIGN STRUCTURE RETAIN
APPROX. STA. 553+50.00
REMOVE EXISTING GUIDE SIGN PANEL FOR EXIT 116


EAST 30
WEST 30
BENTON
MALVERN
HOT SPRINGS
REMOVE
SEVIER ST WEST
TO AR 229
SEVIER ST EAST
SOUTH ST
STOP
HOT SPRINGS
TEXARKANA
WEST 30
EXIT 116
Sevier St
South St
1 MILE
PROPOSED OVERHEAD GUIDE SIGN PANEL
APPROX. STA. 580+00.00
SPEED LIMIT 45
WRONG WAY
BRIDGE MAY ICE IN COLD WEATHER
RIGHT LANE MUST TURN RIGHT
LEFT LANE MUST TURN LEFT
1000 FT
I-30
20 MPH
DO NOT ENTER
LITTLE ROCK
SEVIER ST EAST
SOUTH ST
EXIT 116
Sevier St
South St
½ MILE
PROPOSED OVERHEAD GUIDE SIGN PANEL
APPROX. STA. 553+50.00

DETAIL - A

SOUTH ST I-30 INTERCHANGE
REMOVED EXISTING SIGNS


200
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200
400
SCALE: 1" = 200' HOR.

PRELIMINARY
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Without Notice

SCOTT E. BENNETT, DIRECTOR

WIDENING OF I-30, SECTION 22

SALINE COUNTY, ARKANSAS
AHTD JOB NO. CA0601
FAP NO: 9991

NET LENGTH OF PROJECT = 5.35 MI

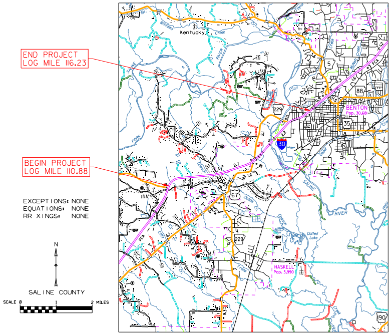
I-30: FROM LOG MILE 110.88
TO LOG MILE 116.23

Saline County
HIGHWAY CLASSIFICATION
URBAN FREEWAY
September 2015
Design Speeds
MAINLANES - 70 MPH
RAMPS - 50 MPH DES. (40 MPH MIN.)
LOOP RAMPS - 20 MPH
FRONTAGE ROADS - 40 MPH
CROSS STREETS - 40 MPH
EXCEPTIONS ARE NOTED ON PLANS

Average Daily Traffic 2013 (2033)

I-30:	54,000	(74,000)

NOT A BIDDING DOCUMENT


END PROJECT
LOG MILE 116.23
BEGIN PROJECT
LOG MILE 110.88
Kentucky
BENTON
HASKELL
30
5
88
229
67
N
SALINE COUNTY
SCALE 0 1 2 MILES

EXCEPTIONS: NONE
EQUATIONS: NONE
RR XINGS: NONE

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EXHIBIT 2

BRIDGEFARMER & ASSOCIATES, INC.