TRANSPORTATION ANALYSIS

BRIGHT STAR ROAD

DRI # 2653
Douglas County, GA

Prepared for:
The Silverman Group
788 Morris Turnpike
Short Hills, NJ 07078

Prepared By:
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December 30, 2016

ENGINEERING WILBURN
Design • Install • Maintain

Report Submitted: December 30, 2016

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The proposed development is expected to be up to 591,250 square feet of Warehouse/Distribution space in multiple buildings. The development is expected to generate an estimated 2,502 gross daily trips.

The proposed development is expected to complete by the end of the Year 2020. All transportation analysis was conducted for this build year.

EXISTING CONDITIONS

Capacity analysis indicates that the study network currently operates at Level of Service (LOS) D or better, with the exception of the intersection of Bright Star Road and SR 8.

NO BUILD CONDITIONS

The No-Build Volumes were developed according to a background growth rate of 1% per year, compounded annually for three years.

Capacity analyses of the No-Build Volumes indicate that a number of improvements will be needed to maintain the LOS D, including the installation of traffic signals at the intersections of Bright Star Road at SR 8, and Bright Star Road at Bright Star Connector. The improvements required to maintain LOS standards for the No-Build conditions are listed in Table 18 on Page 32.

BUILD CONDITIONS

Capacity analysis for the Build Volumes revealed that additional improvements will be needed to maintain the LOS D, including the installation of a traffic signal and modification of lane geometry at the intersection of Bright Star Road and Wood Road. The improvements required to maintain LOS standards for the Build condition are provided in Table 19 on Page 34.

CONTENTS

APPENDICES

FIGURES

TABLES

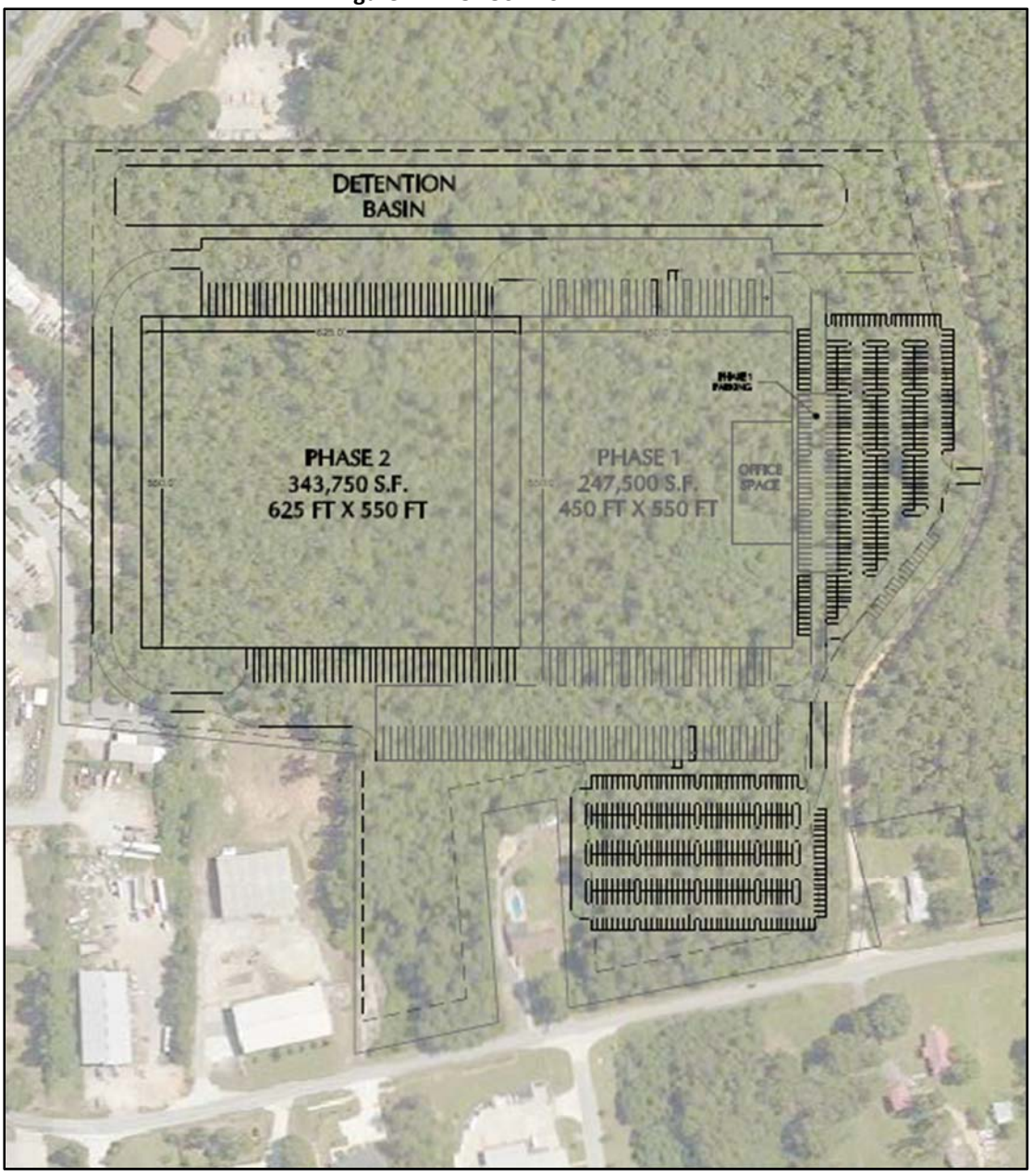
DESCRIPTION OF DEVELOPMENT

The project proposes to construct 591,250 S.F. of warehouse space in two phases over three years. A small amount of office and manufacturing use is expected to be included but the majority of the use will be warehouse. The development will be accessed via Wood Road.

Phase 1 consists of 247,500 S.F. and is scheduled to be constructed by 2017. Phase 2 consists of 343,750 S.F. and is expected to be constructed by 2020.

Figure 1 shows the proposed site plan.

Figure 1: PROPOSED SITE PLAN

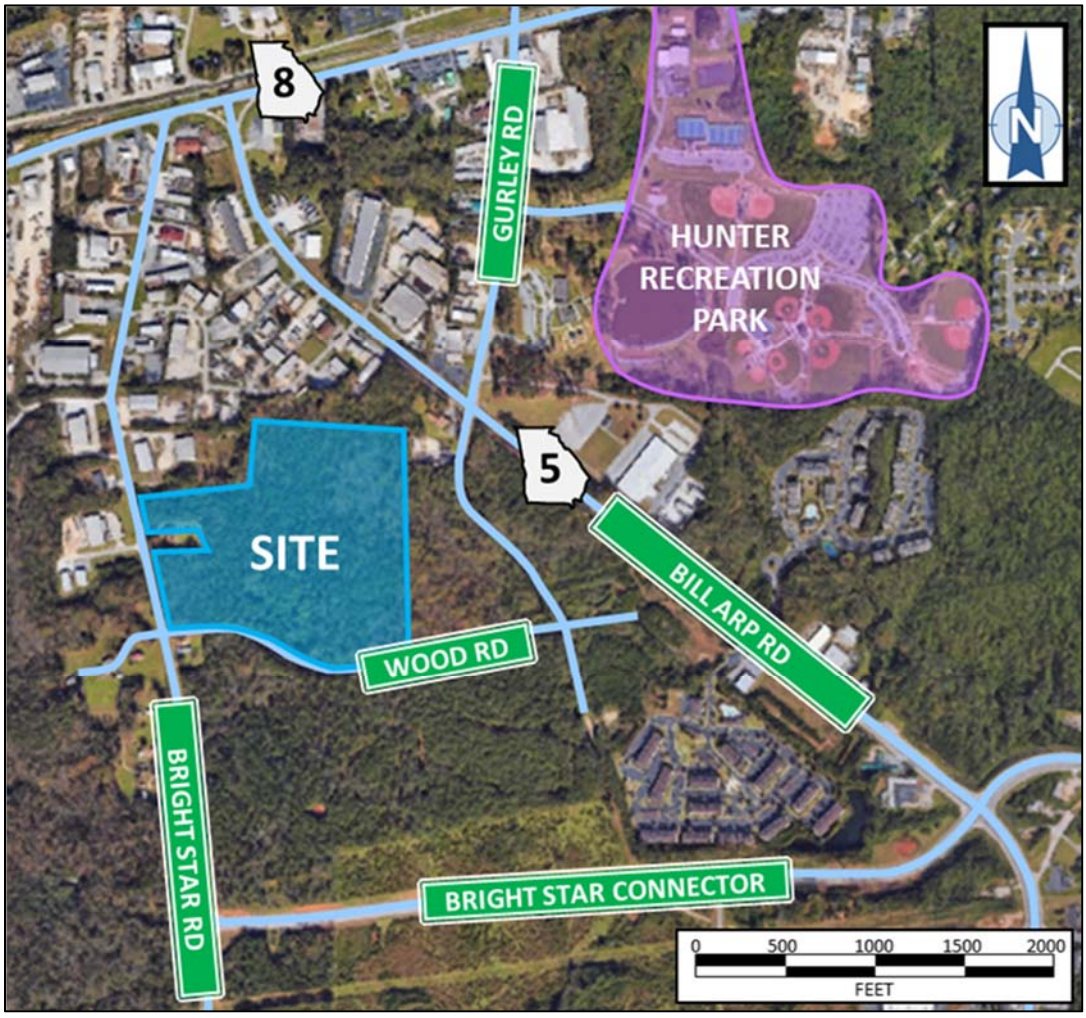


The project is located in western Douglasville, GA. Figure 2 shows the approximate location of the project.

Figure 2: PROJECT LOCATION MAP

Figure 3 provides a more detailed map and shows the roadway network. Currently, access to the site is proposed via Wood Road, which intersects Bright Star Road on the southwest side of the site. Surrounding the site is a mix of business and residential areas.

Figure 3: PROJECT LOCATION MAP

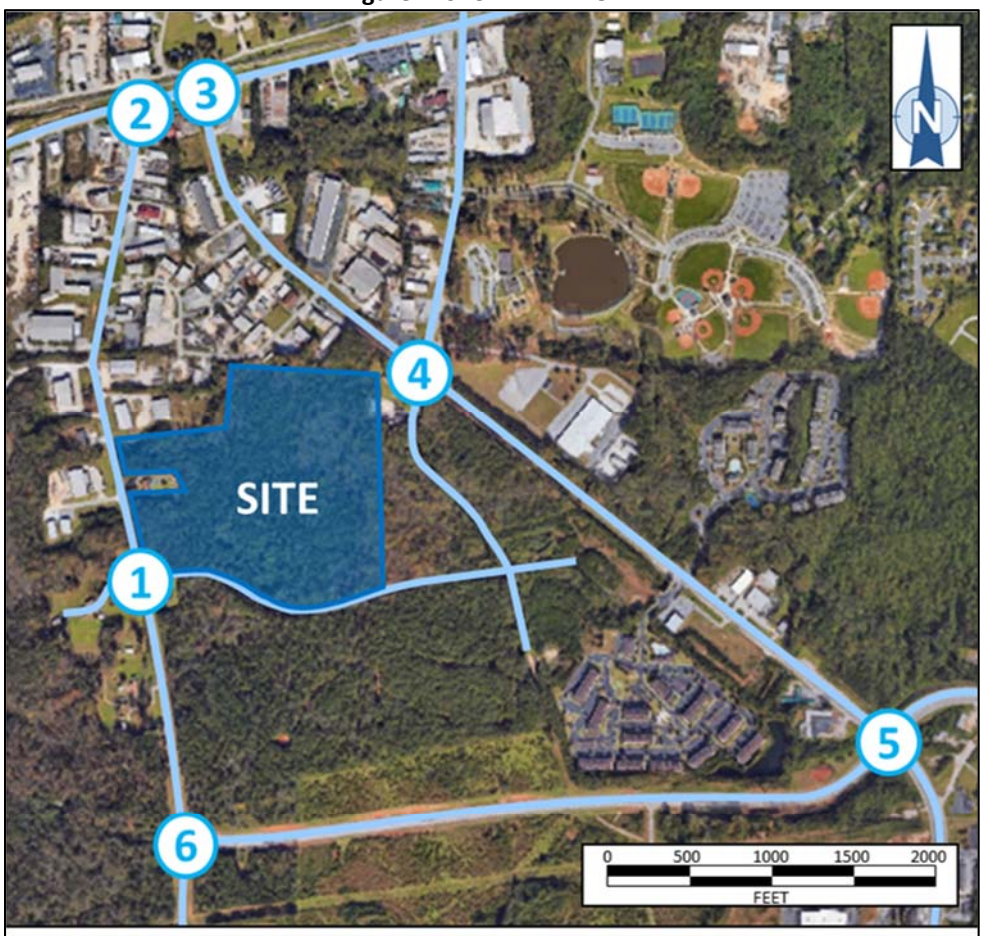


A methodology meeting was held with planners from GRTA, Atlanta Regional Commission, the City of Douglasville, and the Georgia Department of Transportation. Appendix A contains the Letter of Understanding prepared by GRTA that details the methodology to be followed for the traffic analysis. The following sections summarize the methodology.

STUDY NETWORK

Figure 4 shows the extent of the study network.

Figure 4: STUDY NETWORK



STUDY INTERSECTIONS

1. Bright Star Rd & Wood Rd
2. Bright Star Rd & SR 8 (US 78)
3. SR 8 (US 78) & SR 5 (Bill Arp Rd)
4. SR 5 (Bill Arp Rd) & Gurley Rd
5. SR 5 (Bill Arp Rd) & Bright Star Connector/Rose Ave
6. Bright Star Connector & Bright Star Rd

BACKGROUND TRAFFIC GROWTH RATES

The development will be evaluated in one phase with an estimated build-out year of 2020. The rate of growth for the background traffic between the current time and the Year 2020 is assumed to be 1.0%, compounded annually. This growth rate translates to a growth factor of 1.03 from Existing volumes to 2020 volumes.

TRIP GENERATION

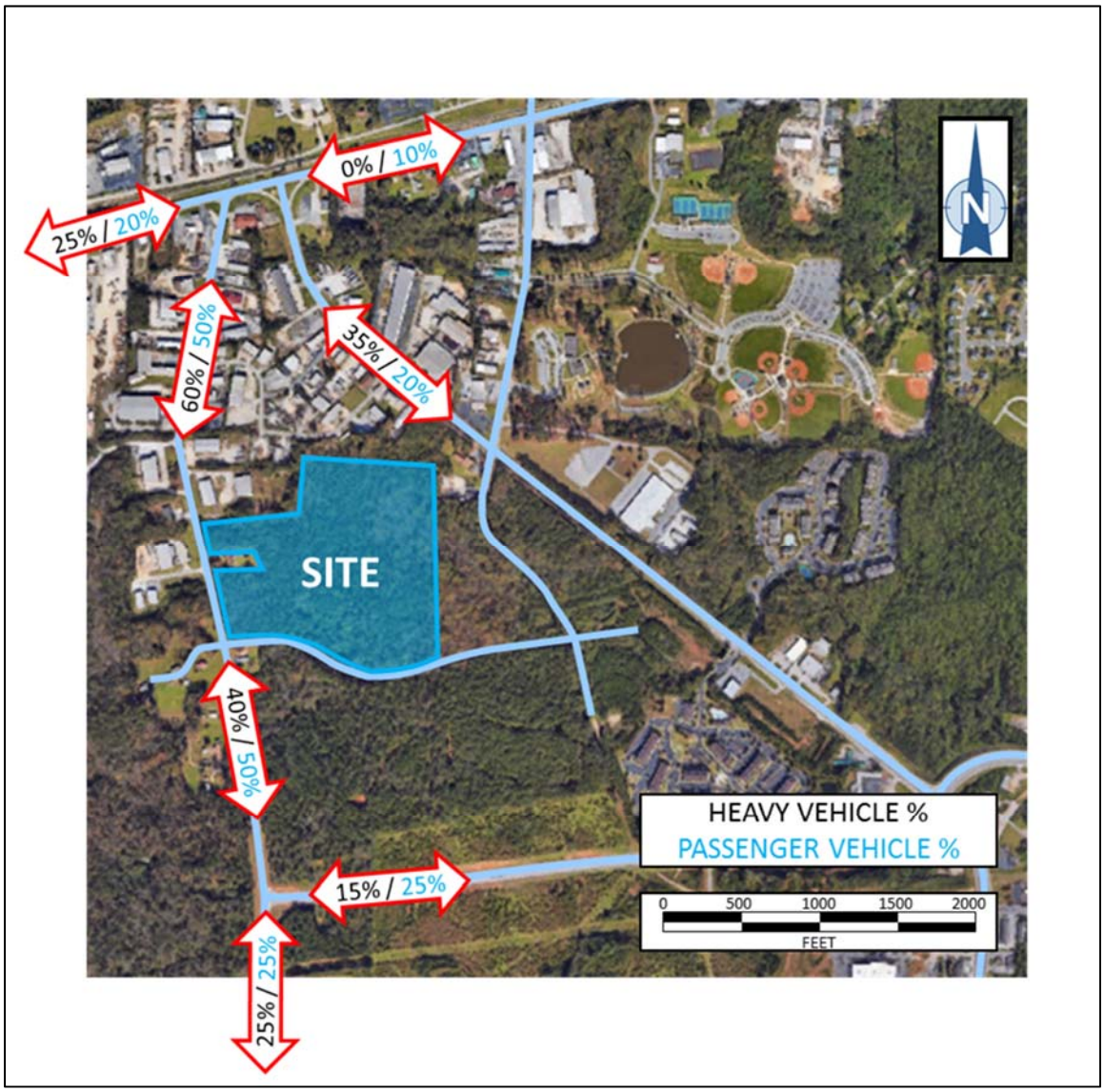
Trip generation will be estimated for the AM and PM Peak Hours using data contained in the ITE publication *Trip Generation*, 9th Edition and the *Trip Generation Handbook*, 2nd Edition. The Trip Generation Program from Trafficware will be used to perform the trip generation calculations.

The composition of the manufacturing/distribution trips was discussed at the Methodology Meeting. It was decided to assume that 20% of the trips would be heavy vehicles and the remaining 80% would be passenger vehicles.

TRIP DISTRIBUTION

Based on the discussion at the Methodology Meeting, the trip distribution as illustrated in Figure 5 will be used to assign the generated traffic. Different assignment patterns will be used for passenger vehicles and heavy vehicles.

Figure 5: TRIP DISTRIBUTION FOR TRAFFIC ASSIGNMENT



LEVEL OF SERVICE STANDARDS

Every roadway segment and intersection in the study network will be analyzed for "required improvements needed to meet minimum level of service standards. The minimum level of service standard for all analyses shall be LOS D, as agreed upon in the Methodology Meeting. However, if the existing LOS for the segment or intersection is below the applicable level of service for a particular time period (e.g., A.M. peak period, P.M. peak period, etc.), then the measured LOS service for that segment and time periods is the standard by which the "base" and "future" traffic conditions will be evaluated.

For example, if an intersection or segment currently operates at LOS E for a certain peak period, then the LOS standard for that intersection or segment for "base" and "future" conditions becomes LOS E (only for that intersection and only for that peak period). The "base" conditions is the year 2020 traffic without the development traffic (also called future "no-build" conditions) and the "future" is the phase year with the development traffic (also called future "build" conditions).

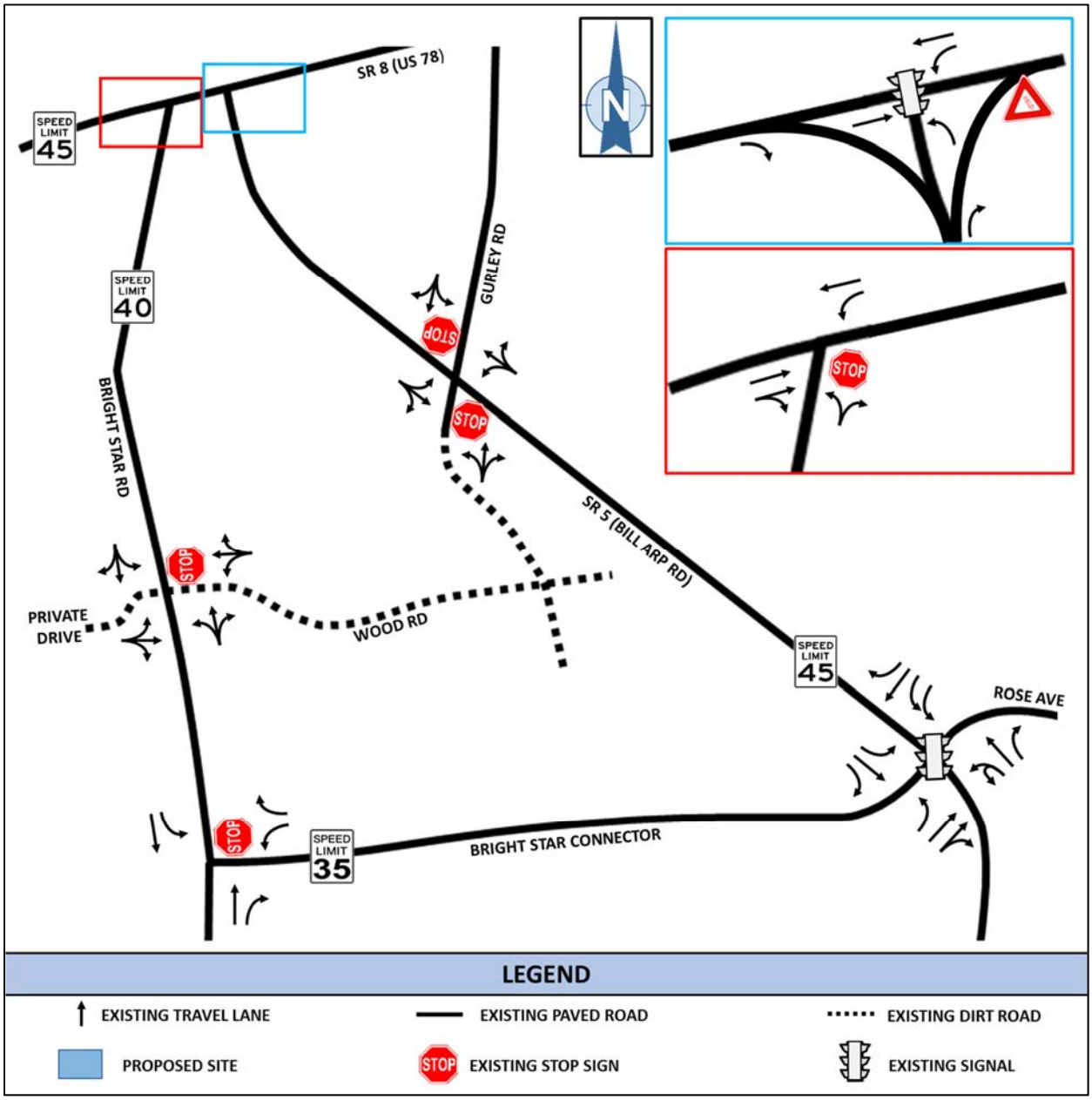
As required in the technical guidelines, specific "required improvements" will be identified to bring the "base" LOS and "future" LOS for every roadway segment and intersection up to the applicable LOS standard.

If the existing LOS for the segment or intersection is LOS F, then the future "no-build' and future "build" LOS standard will be LOS E.

INVENTORY OF EXISTING GEOMETRY AND TRAFFIC CONTROL

Figure 6 summarizes the existing geometry and traffic control on the roadways within the study area.

Figure 6: EXISTING CONDITIONS



EXISTING PEAK HOUR TRAFFIC VOLUMES

Turning movement volumes were collected on Tuesday, December 13, 2016. Volumes were collected during the AM and PM peak periods on a typical weekday when local schools were in session.

Figure 7 summarizes the peak hour volumes for the collected periods. The full traffic data reports for the Turning Movement Counts (TMC's) are included in Appendix B.

Figure 7: EXISTING PEAK HOUR TRAFFIC VOLUMES

Planned improvements in and around the study network are listed below in Table 1.

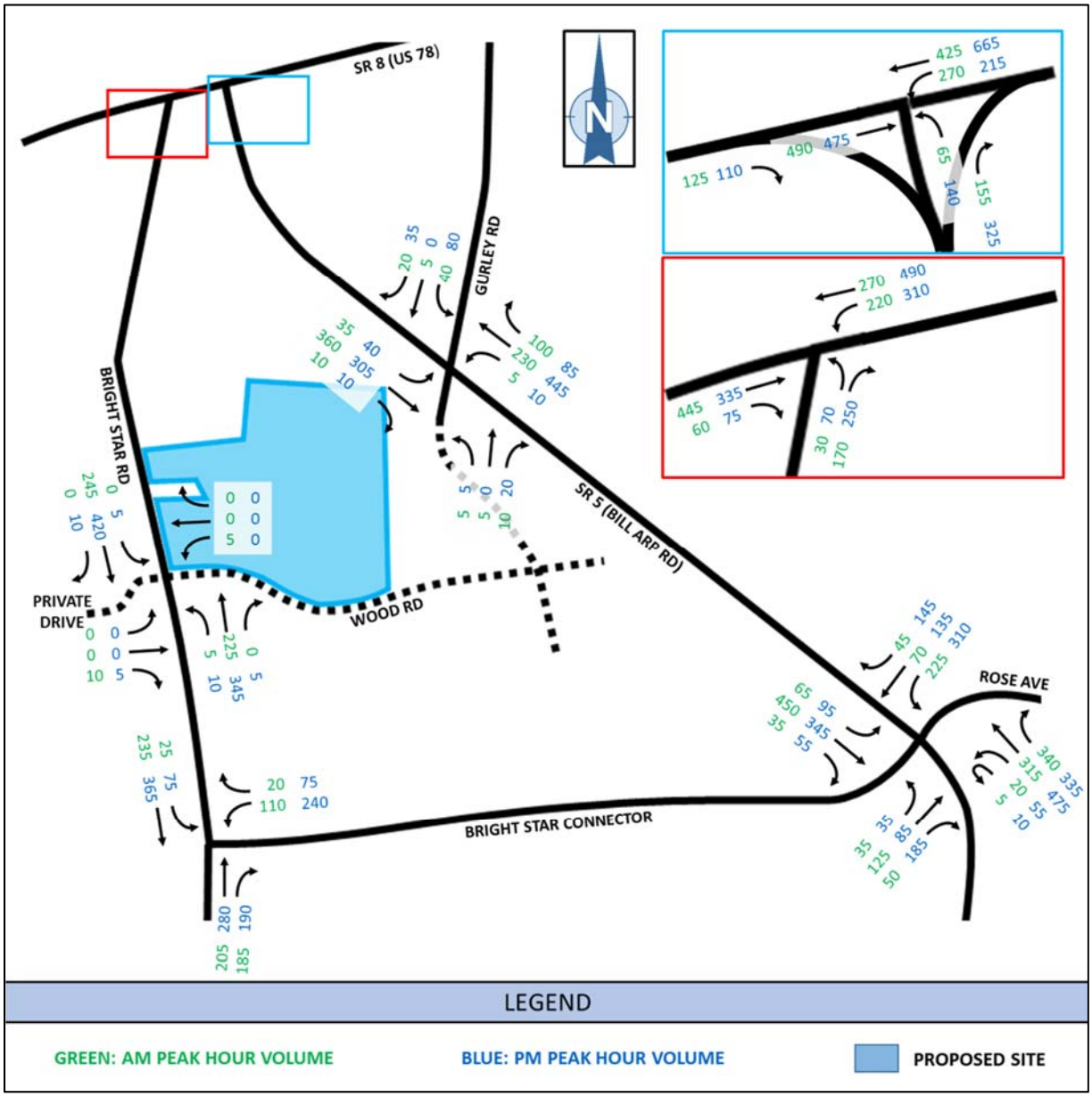
Table 1: PLANNED IMPROVEMENTS

SOURCE	PROJECT ID	DESCRIPTION	STATUS
GDOT CWP	0010759	Widening and installation of auxiliary left turn lane on SR 8 from SR 5 to Strickland Ave	ROW Complete, CST Schedule for 2017

NO-BUILD TRAFFIC GROWTH

The procedure established for estimating the projected traffic volumes for the No-Build Condition was to increase the existing traffic by 1%, compounded annually over 3 years. This rate translates to a growth factor of 1.03 over 3 years. Figure 8 shows these volumes rounded up to the nearest 5.

Figure 8: 2020 NO-BUILD VOLUMES



TRIP GENERATION

Estimates of traffic volumes expected to be generated by the proposed facility were calculated using the trip rates obtained from the ITE publication *Trip Generation*, 9th Edition and the *Trip Generation Handbook*, 2nd Edition. The Trip Generation Program from Trafficware was used to perform the trip generation calculations.

Truck traffic was assumed to be twenty percent (20%) of the trip generation as agreed upon in the Methodology Meeting.

Table 2 summarizes the estimated trip generation. The light blue area represents Phase 1 (2017) with the total on the first row and the car and truck breakdown on the next two rows. The darker blue area represents Phase 2 (2020) with the total on the first row and the car and truck breakdown on the following two rows.

The total of both phases 1 and 2 is shown in the gray area. The trip generation data is provided in Appendix C.

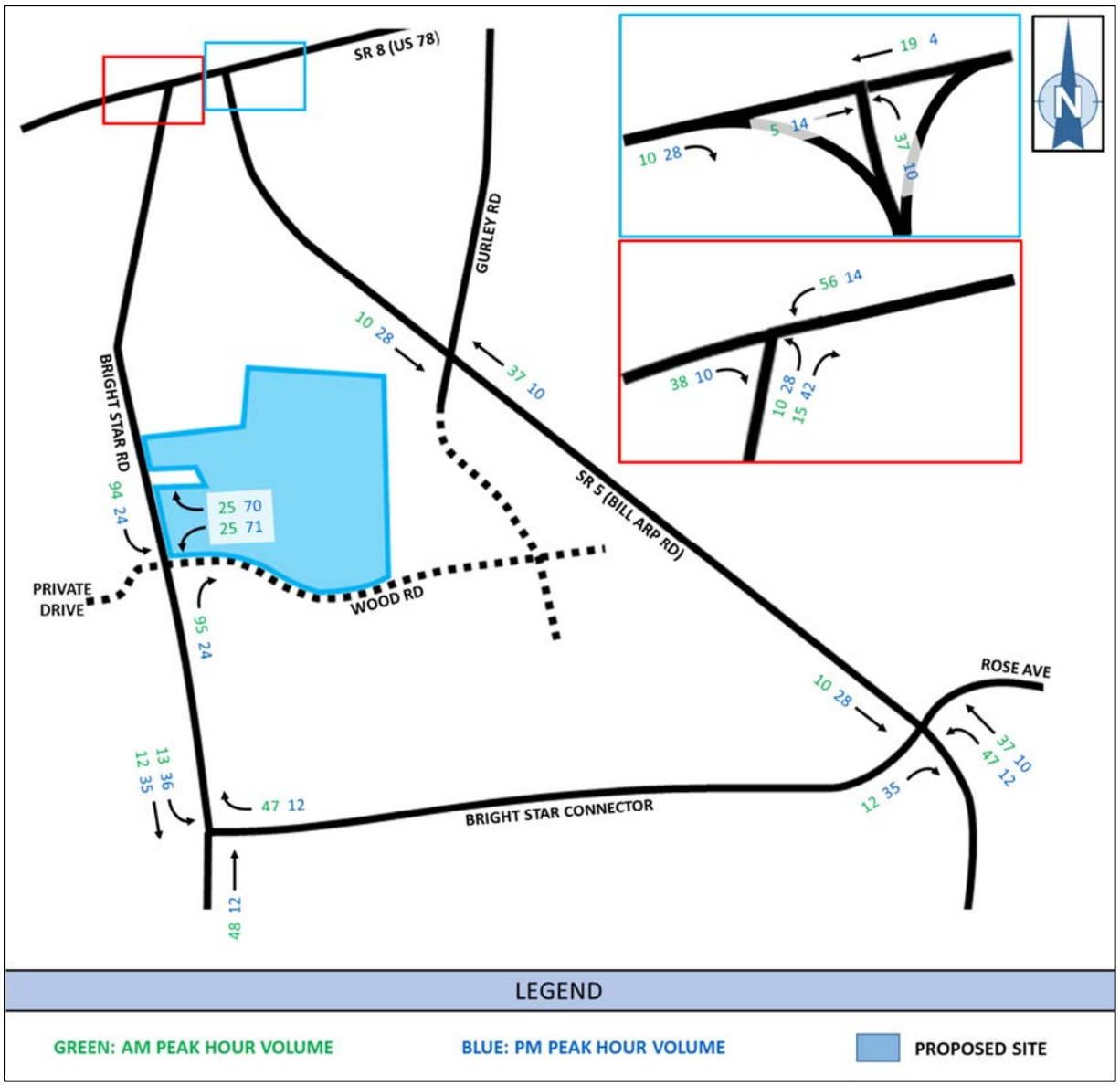
Table 2: TRIP GENERATION

PHASE	YEAR	LAND USE	ITE CODE	SIZE	WEEKDAY AVERAGE DAILY			WEEKDAY AM			WEEKDAY PM		
					ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT	TOTAL
1	2017	Warehousing	150	247.5 ksf	538	538	1076	107	29	136	27	79	106
				Cars (80%)	430	430	860	86	23	109	22	63	85
				Trucks (20%)	108	108	216	21	6	27	5	16	21
2	2020	Warehousing	150	343.75 ksf	713	713	1426	129	34	163	33	98	131
				Cars (80%)	570	570	1140	103	27	130	26	78	104
				Trucks (20%	143	143	286	26	7	33	7	20	27
TOTAL VOLUME ADDED TO ADJACENT SYSTEM					**1251**	**1251**	**2502**	**236**	**63**	**299**	**60**	**177**	**237**
Cars (80%)					**1000**	**1000**	**2000**	**189**	**50**	**239**	**48**	**141**	**189**
Trucks (20%)					**251**	**251**	**502**	**47**	**13**	**60**	**12**	**36**	**48**

ASSIGNMENT OF NEW PASSENGER CAR TRIPS

Figure 9 shows the assignment of new passenger car trips to the study network.

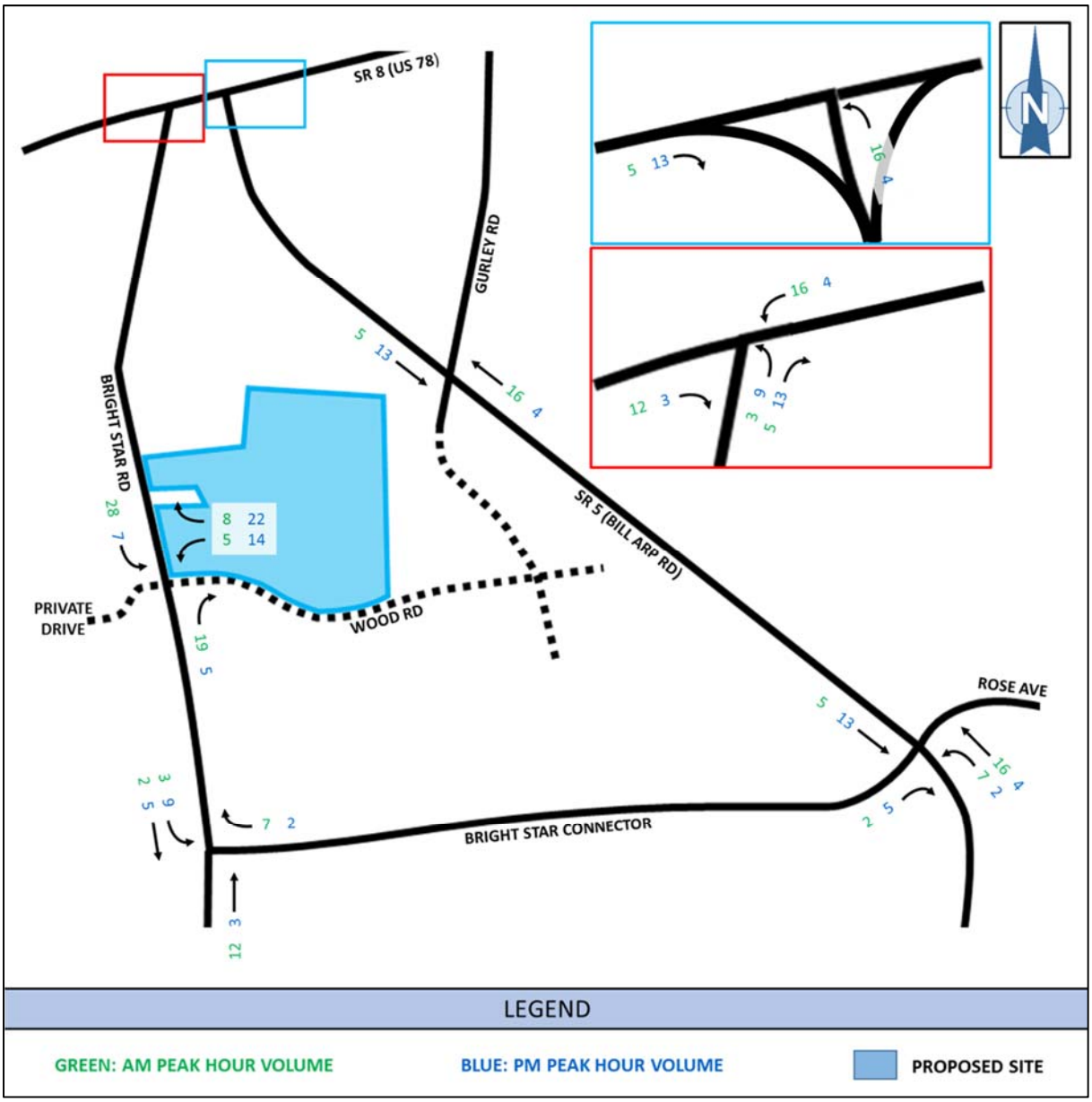
Figure 9: ASSIGNMENT OF PASSENGER VEHICLE TRIPS



ASSIGNMENT OF NEW TRUCK TRIPS

Figure 10 shows the assignment of new heavy vehicle trips.

Figure 10: ASSIGNMENT OF HEAVY VEHICLE TRIPS



TOTAL NEW TRIPS

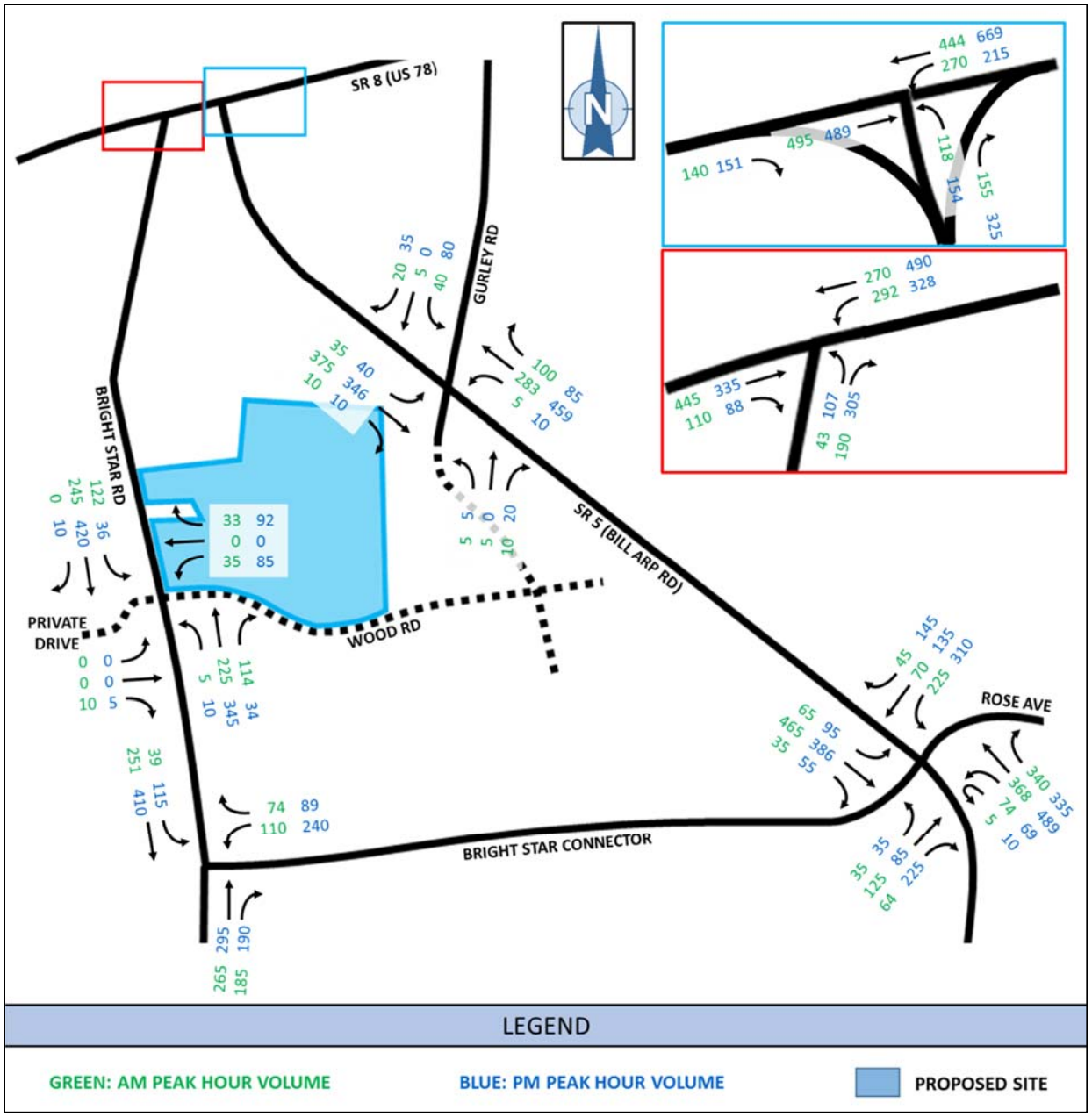
Figure 11 shows the total generated new trips. Figure 11 was developed by combining the assigned passenger cars shown in Figure 9 and the heavy vehicle volumes in Figure 10.

Figure 11: TOTAL GENERATED NEW TRIPS

2020 BUILD TRAFFIC VOLUMES

Figure 12 illustrates the Year 2020 Projected Volumes including the No-Build traffic and the Build-out of the development. Figure 12 was developed by adding the No-Build Volumes shown in Figure 8 with the total new trips shown in Figure 11.

Figure 12: 2020 BUILD VOLUMES



Existing and Projected Volumes were evaluated using capacity analysis techniques described in the *Highway Capacity Manual*, *Special Report 209*, published by the Transportation Research Board, 2010. The *Synchro Program* (Version 9) from Trafficware was used to facilitate the intersection analysis. The HCM level-of-service definitions for signalized and stop control intersections are summarized in Table 3.

Table 3: INTERSECTION LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	SIGNALIZED INTERSECTIONS	STOP CONTROLLED INTERSECTIONS
	STOPPED DELAY PER VEHICLE (SECONDS)	STOPPED DELAY PER VEHICLE (SECONDS)
A	≤10.0	≤10.0
B	10.1 to 20.0	10.1 to 15.0
C	20.1 to 35.0	15.1 to 25.0
D	35.1 to 55.0	25.1 to 35.0
E	55.1 to 80.0	35.1 to 50.0
F	>80.0	>50.0

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010

Capacity analysis is shown for signalized intersections first followed by unsignalized intersections. Capacity analysis results for unsignalized intersections provide estimates of level of service (LOS) for each minor movement that is required to yield to free flow movements. LOS for each movement is shown followed by the estimated delay per vehicle in seconds.

The Existing and Projected Volumes were evaluated with the existing geomety first. The Existing and Projected Volumes were then evaluated to determine the minimum improvements necessary to meet the LOS standard.

CAPACITY ANALYSIS RESULTS, EXISTING CONDITIONS

Signalized Intersections

Table 4 summarizes the results of the capacity analysis for the existing signalized intersections. Capacity analysis reports for the Existing Conditions are provided in Appendix D.

Table 4: EVALUATION OF EXISTING VOLUMES, SIGNALIZED INTERSECTIONS

INTERSECTION	AM PEAK HOUR	PM PEAK HOUR
SR 5 (Bill Arp Road) & SR 8	B (16.5)	B (15.2)
Bright Star Connector & Rose Ave/SR 5	B (19.9)	C (23.4)

The capacity analysis results indicate that all signalized intersections operate at LOS 'C' or better under Existing Conditions.

Stop-Controlled Intersections

Table 5 summarizes the results of the capacity analysis for the existing unsignalized intersections. Poor operating conditions are shown in gray. Capacity analysis reports for the Existing Conditions are provided in Appendix D.

Table 5: EVALUATION OF EXISTING VOLUMES, UNSIGNALIZED INTERSECTIONS

INTERSECTION	MOVEMENT	AM PEAK HOUR	PM PEAK HOUR
Bright Star Road & Wood Road	EB - L/T/R	A (9.7)	B (7.4)
	WB - L/T/R	B (13.0)	A (0.0)
	NB - L/T/R	A (0.1)	A (0.1)
	SB - L/T/R	A (0.0)	A (0.1)
SR 8 & Bright Star Rd	EB - T	A (0.0)	A (0.0)
	EB - R	A (0.0)	A (0.0)
	WB - L	A (9.2)	A (9.1)
	WB - T	A (0.0)	A (0.0)
	NB - L/R	C (20.3)	F (328.2)
SR 5 (Bill Arp Road) & Gurley Rd	EB - L/T/R	A (1.1)	A (1.2)
	WB - L/T/R	A (0.4)	A (0.1)
	NB - L/T/R	C (15.4)	C (17.5)
	SB - L/T/R	C (20.3)	D (28.5)
Bright Star Road & Brightstar Connector	WB - L	C (15.2)	D (32.1)
	WB - R	A (9.6)	B (10.4)
	NB - T	A (0.0)	A (0.0)
	NB - R	A (0.0)	A (0.0)
	SB - L	A (8.2)	A (8.0)
	SB - T	A (0.0)	A (0.0)

The results indicate that one un-signalized intersection currently operates with LOS 'F'. Therefore, the LOS standard for this intersection is LOS 'E'.

CAPACITY ANALYSIS RESULTS, 2020 NO-BUILD VOLUMES

Intersections that are Currently Signalized

Table 6 summarizes the results of the capacity analysis with the 2020 No-Build Volumes for the intersections that are currently signalized.

Table 6: EVALUATION OF 2020 NO-BUILD VOLUMES, SIGNALIZED INTERSECTIONS

INTERSECTION	AM PEAK HOUR		PM PEAK HOUR	
	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
SR 8 & SR 5 (Bill Arp Road)	B (18.0)	N/A	B (16.2)	N/A
Bright Star Connector & Rose Ave/SR 5	C (20.8)	N/A	C (24.5)	N/A

Capacity analysis reports for the intersections that are currently signalized with the 2020 No-Build Volumes are provided in the following appendices:

- Appendix E - with Existing Geometry

Intersections that are Currently Stop-Controlled

Table 7 summarizes the results of the capacity analysis with the 2020 No-Build Volumes for the intersections that are currently stop-controlled. The intersections that do not meet LOS standards are shown in gray and the improvements required to bring them up to standard are indicated in the footnotes. The required improvements are shown in Figure 14 on Page 33.

Table 7: EVALUATION OF 2020 NO-BUILD VOLUMES, UNSIGNALIZED INTERSECTIONS

INTERSECTION	MOVEMENT	AM PEAK HOUR		PM PEAK HOUR	
		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
Bright Star Road & Wood Road	EB - L/T/R	A (9.8)	N/A	B (11.4)	N/A
	WB - L/T/R	B (14.4)		A (0.0)	
	NB - L/T/R	A (0.7)		A (0.6)	
	SB - L/T/R	A (0.0)		A (0.5)	
SR 8 & Bright Star Road	EB - T	A (0.0)	A (6.2)**	A (0.0)	A (9.9)**
	EB - R	A (0.0)		A (0.0)	
	WB - L	A (9.5)		A (9.2)	
	WB - T	A (0.0)		A (0.0)	
	NB - L/R	E (39.5)		F (629.3)	
SR 5 (Bill Arp Road) & Gurley Road	EB - L/T/R	A (1.4)	N/A	A (1.8)	N/A
	WB - L/T/R	A (0.6)		A (0.5)	
	NB - L/T/R	C (21.4)		C (22.0)	
	SB - L/T/R	D (25.4)		F (51.4)	
Bright Star Road & Brightstar Connector	WB - L	C (17.8)	A (5.2)***	F (67.9)	A (7.2)***
	WB - R	A (9.7)		B (10.7)	
	NB - T	A (0.0)		A (0.0)	
	NB - R	A (0.0)		A (0.0)	
	SB - L	A (8.4)		A (8.2)	
	SB - T	A (0.0)		A (0.0)	

**Through coordinated operation under one controller with the signal at SR 8 and Bright Star Road, the signal at SR 8 and SR 5 (Bill Arp Road) is expected to operate at LOS 'A' with a delay of 6.8 seconds in the AM Peak Hour and at LOS 'B' with a delay of 14.0 seconds in the PM Peak Hour.

***Although a roundabout was recommended for improvement at this location (I-20 @ SR 5/Bright Star Road Transportation Study, February 2015), signal control would provide acceptable operation as well. Under signal control, this intersection is expected to operate at LOS 'A' with a delay of 5.5 seconds in the AM Peak Hour and at LOS 'A' with a delay of 8.3 seconds in the PM Peak Hour.

Capacity analysis reports for the intersections that are currently stop-controlled with the 2020 Build Volumes are provided in the following appendices:

- Appendix E - with Existing Geometry
- Appendix F – With Recommended Improvements

Signal Warrant Analysis, 2020 No-Build Conditions

2020 No-Build capacity analysis determined that stop control operation at some of the unsignalized intersections will not provide acceptable LOS through the Year 2020. Traffic signal control would significantly improve the operation, if warranted. Traffic signal warrant analysis was conducted to determine if warrants would be met for the intersections of SR 5 (Bill Arp Road) at Gurley Road and Bright Star Road at Bright Star Connector.

The warrant analysis was conducted in accordance with the requirements of the *Manual on Uniform Traffic Control Devices*, 2009 (MUTCD) published by the Federal Highway Administration. The MUTCD contains provisions for reducing the minimum volumes when the major street speed exceeds 40 mph. 70% thresholds were used to evaluate signal warrants at the intersections of Bright Star Road at Wood Road and Bright Star Road at Bright Star Connector. The GDOT requires the 100% thresholds be used in signal warrant evaluation regardless of speed limit, therefore the intersections of Bright Star Road at SR 8 and SR 5 (Bill Arp Road) at Gurley Road were evaluated based on 100% thresholds.

The warrant analysis was conducted in two ways: the conventional method, using the side street volumes, and the alternate method, using the main street left turn volumes. This traffic signal warrant analysis was conducted using the 8th Highest Hour method to evaluate the vehicular volume-related warrants (Warrants 1, 2, and 3).

Since Warrant 1 requires hourly volumes to meet thresholds for a minimum of eight hours, it was necessary to estimate the 8th highest hour for 2020 No-Build and 2020 Build. If the 8th highest hour warrants a traffic signal, then the 7 higher hours would also meet Warrant 1.

The 8th Highest Hour Volumes were estimated by applying a factor of 5.6% to volumes obtained from GDOT count stations #0970016 on Bill Arp Road (SR 5), and #0970225 on Bright Star Road. The 5.6% factor is in accordance with the GDOT Design Manual.

Further analysis was conducted to check each of the intersections against Warrant 2 – Four Hour Vehicular Volume. The 4th highest hour was estimated by interpolating between the highest hour and the 8th highest hour. Thresholds for Warrant 2 were obtained from Figure 4C-1 and Figure 4C-2 found in Chapter 4 of the *Manual on Uniform Traffic Control Devices, 2009* (MUTCD). These figures are provided in Appendix G.

The derived 8th and 4th highest hour volumes were compared to the warrant requirements contained in the *Manual on Uniform Traffic Control Devices, 2009* (MUTCD) published by the Federal Highway Administration.

Thresholds for Warrant 3 were obtained from Figure 4C-3 and Figure 4C-4 found in Chapter 4 of the *Manual on Uniform Traffic Control Devices, 2009* (MUTCD). These figures are provided in Appendix G.

The conventional method allows the warrant analysis to be conducted using side street volumes. Only the left turn volumes were considered on the minor approach, since a right turn lane will be provided.

Table 8 shows the signal warrant analysis performed via the conventional method for 2020 No-Build conditions.

Table 8: SIGNAL WARRANT ANALYSIS (CONVENTIONAL METHOD), 2020 NO-BUILD CONDITIONS

WARRANT 1

INTERSECTION	DAILY VOLUME		8TH HIGHEST HOUR		CONDITION A – MET?				CONDITION B – MET?			
	MAJOR ROAD	MINOR ROAD	MAJOR ROAD	MINOR ROAD	MAJOR ROAD		MINOR ROAD		MAJOR ROAD		MINOR ROAD	
					Threshold	Met?	Threshold	Met?	Threshold	Met?	Threshold	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8351	887	468	50	(100%) 500	N	(100%) 150	N	(100%) 750	N	(100%) 75	N
Bright Star Rd & Bright Star Connector	6400	2133	358	119	(70%) 350	Y	(70%) 105	Y	(70%) 525	N	(70%) 53	Y
SR 8 & Bright Star Road	11350	700	636	39	(70%) 350	N	(70%) 105	N	(70%) 525	N	(70%) 53	N

WARRANT 2

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED FOUR HIGHEST HOURS				Warrant 2	
			Hour 1	Hour 2	Hour 3	Hour 4	Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8351	887	9.58%	9.01%	8.45%	7.88%	100%	N
			800/85	752/80	706/75	658/70		
Bright Star Rd & Bright Star Connector	6400	2133	11.25%	10.44%	9.64%	8.83%	70%	Y
			720/240	668/223	617/206	565/188		
SR 8 & Bright Star Road	11350	700	10%	9.38%	8.75%	8.12%	70%	N
			1153/107	1082/100	1009/94	936/87		

WARRANT 3

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED PEAK HOUR	Warrant 3	
				Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8351	887	9.58%	100%	N
			800/85		
Bright Star Rd & Bright Star Connector	6400	2133	11.25%	70%	Y
			720/240		
SR 8 & Bright Star Road	11350	700	10%	70%	N
			1153/107		

The intersection of Bright Star Road at Bright Star Connector is expected to meet Signal Warrants 1, 2, and 3 via the conventional method under 2020 No-Build conditions.

Table 9 shows the 2020 signal warrant analysis via the alternate method.

Table 9: SIGNAL WARRANT ANALYSIS (ALTERNATE METHOD), 2020 NO-BUILD CONDITIONS

WARRANT 1

INTERSECTION	DAILY VOLUME		8TH HIGHEST HOUR		CONDITION A – MET?				CONDITION B – MET?			
	MAJOR ROAD	MINOR ROAD	MAJOR ROAD	MINOR ROAD	MAJOR ROAD		MINOR ROAD		MAJOR ROAD		MINOR ROAD	
					Threshold	Met?	Threshold	Met?	Threshold	Met?	Threshold	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4750	418	266	23	(100%) 500	N	(100%) 150	N	(100%) 750	N	(100%) 75	N
Bright Star Rd & Bright Star Connector	2489	667	139	37	(70%) 350	N	(70%) 105	N	(70%) 525	N	(70%) 53	N
SR 8 & Bright Star Road	3350	3100	188	174	(70%) 350	N	(70%) 105	Y	(70%) 525	N	(70%) 53	Y

WARRANT 2

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED FOUR HIGHEST HOURS				Warrant 2	
			Hour 1	Hour 2	Hour 3	Hour 4	Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4750	418	9.58%	9.01%	8.45%	7.88%	100%	N
			455/40	428/38	401/35	374/33		
Bright Star Rd & Bright Star Connector	2489	667	11.25%	10.44%	9.64%	8.83%	70%	N
			280/75	260/70	240/64	220/59		
SR 8 & Bright Star Road	3350	3100	10%	9.38%	8.75%	8.12%	70%	Y
			335/310	314/291	293/271	272/252		

WARRANT 3

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED PEAK HOUR	Warrant 3	
				Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4750	418	9.58%	100%	N
			455/40		
Bright Star Rd & Bright Star Connector	2489	667	11.25%	70%	N
			280/75		
SR 8 & Bright Star Road	3350	3100	10%	70%	Y
			335/310		

The intersection of SR 8 at Bright Star Road is expected to meet Signal Warrants 1, 2, and 3 via the alternate method under 2020 No-Build conditions.

CAPACITY ANALYSIS RESULTS, 2020 BUILD VOLUMES

Intersections that are Currently Signalized

Table 10 summarizes the results of the capacity analysis with the 2020 Build Volumes for the intersections that are currently signalized. Capacity analysis reports for the intersections that are currently signal-controlled with the 2020 Build Volumes are provided in Appendix G.

Table 10: EVALUATION OF 2020 BUILD VOLUMES, SIGNALIZED INTERSECTIONS

INTERSECTION	AM PEAK HOUR		PM PEAK HOUR	
	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
SR 8 & SR 5 (Bill Arp Road)	B (18.0)	N/A	B (16.7)	N/A
Bright Star Connector & Rose Ave/SR 5	C (20.4)	N/A	C (23.7)	N/A

The improvements required to meet the minimum LOS standards are shown in Figure 14 on Page 32.

Intersections that are Currently Stop-Controlled

Table 11 summarizes the results of the capacity analysis with the 2020 Build Volumes for the intersections that are currently unsignalized. The intersections that do not meet LOS standards are shown in gray. The resulting LOS with the required improvements are listed below in Table 10 and shown in Figure 15 on Page 34.

Table 11: EVALUATION OF 2020 BUILD VOLUMES, UNSIGNALIZED INTERSECTIONS

INTERSECTION	MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	
Bright Star Road & Wood Road	EB - L/T/R	A (9.8)	EB-L/T/R	A (9.8)	B (11.4)	EB-L/T/R	B (11.4)
			WB-L	E (46.3)		WB-L	F (92.7)
	WB - L/T/R	E (48.2)	WB-T/R	B (10.4)	F (*)	WB-T/R	B (12.1)
			NB-L/T	A (0.7)		NB-L/T	A (0.6)
	NB - L/T/R	A (0.5)	NB-R	A (0.0)	A (0.5)	NB-R	A (0.0)
			SB-L	A (8.9)		SB-L	A (9.5)
	SB - L/T/R	A (3.6)	SB-T/R	A (0.0)	A (3.4)	SB-T/R	A (0.0)
SR 8 & Bright Star Road	EB - T	A (0.0)	B (11.2)**		A (0.0)	B (10.1)**	
	EB - R	A (0.0)			A (0.0)		
	WB - L	A (10.0)			A (9.5)		
	WB - T	A (0.0)			A (0.0)		
	NB - L/R	F (198.3)			F (*)		
SR 5 (Bill Arp Road) & Gurley Road	EB - L/T/R	A (1.5)	N/A		A (1.7)	N/A	
	WB - L/T/R	A (0.5)			A (0.5)		
	NB - L/T/R	C (24.8)			C (24.1)		
	SB - L/T/R	D (30.5)			F (63.8)		
Bright Star Road & Brightstar Connector	WB - L	C (23.1)	A (5.7)***		F (160.2)	A (8.4)***	
	WB - R	B (10.6)			B (11.0)		
	NB - T	A (0.0)			A (0.0)		
	NB - R	A (0.0)			A (0.0)		
	SB - L	A (8.7)			A (8.3)		
	SB - T	A (0.0)			A (0.0)		

*Asterisks indicate conditions with LOS F but with delays higher than the range for which HCM procedures are valid.

**Through coordinated operation under one controller with the signal at SR 8 and Bright Star Road, the signal at SR 8 and SR 5 (Bill Arp Road) is expected to operate at LOS 'B' with a delay of 12.2 seconds in the AM Peak Hour and at LOS 'B' with a delay of 13.1 seconds in the PM Peak Hour.

***Although the recommended improvement at this location is a roundabout, signal control would provide acceptable operation as well. Under signal control, this intersection is expected to operate at LOS 'A' with a delay of 6.2 seconds in the AM Peak Hour and at LOS 'A' with a delay of 7.5 seconds in the PM Peak Hour.

Capacity analysis reports for the intersections that are currently stop-controlled with the 2020 Build Volumes are provided in the following appendices:

- Appendix G - with Existing Geometry
- Appendix H – with Necessary Improvements

Signal Warrant Analysis, 2020 Build Conditions

Signal warrant analysis was conducted in order to determine if warrants would be met under 2020 Build conditions. 2020 Build signal warrant analysis followed the methodology outlined above in the 2020 No-Build Signal Warrant Analysis section. Conventional and Alternate methods were performed. Table 12 shows the signal warrant analysis performed via the conventional method for 2020 Build conditions.

Table 12: SIGNAL WARRANT ANALYSIS (CONVENTIONAL METHOD), 2020 BUILD CONDITIONS

WARRANT 1

INTERSECTION	DAILY VOLUME		8TH HIGHEST HOUR		CONDITION A – MET?				CONDITION B – MET?			
	MAJOR ROAD	MINOR ROAD	MAJOR ROAD	MINOR ROAD	MAJOR ROAD		MINOR ROAD		MAJOR ROAD		MINOR ROAD	
					Threshold	Met?	Threshold	Met?	Threshold	Met?	Threshold	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8925	835	500	47	(100%) 500	Y	(100%) 150	N	(100%) 750	N	(100%) 75	N
Bright Star Rd & Bright Star Connector	7289	2133	408	120	(70%) 350	Y	(70%) 105	Y	(70%) 525	N	(70%) 53	Y
Bright Star Rd & Wood Road	7209	756	404	42	(70%) 350	Y	(70%) 105	N	(70%) 525	N	(70%) 53	N
SR 8 & Bright Star Road	11350	1070	646	60	(70%) 350	Y	(70%) 105	N	(70%) 525	Y	(70%) 53	Y

WARRANT 2

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED FOUR HIGHEST HOURS				Warrant 2	
			Hour 1	Hour 2	Hour 3	Hour 4	Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8925	835	9.58%	9.01%	8.45%	7.88%	100%	N
			855/80	804/75	754/71	703/66		
Bright Star Rd & Bright Star Connector	7289	2133	11.25%	10.44%	9.64%	8.83%	70%	Y
			820/240	761/223	703/206	644/188		
Bright Star Rd & Wood Road	7209	756	11.25%	10.44%	9.64%	8.83%	70%	N
			811/85	753/79	695/73	637/67		
SR 8 & Bright Star Road	11350	1070	10%	9.38%	8.75%	8.12%	70%	Y
			1135/107	1082/100	1009/94	936/87		

Warrant 3

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED PEAK HOUR	Warrant 3	
				Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	8925	835	9.58%	100%	N
			855/80		
Bright Star Rd & Bright Star Connector	7289	2133	11.25%	70%	Y
			820/240		
Bright Star Rd & Wood Road	7209	756	11.25%	70%	N
			811/85		
SR 8 & Bright Star Road	11350	1070	10%	70%	Y
			1135/107		

The intersections of SR 8 at Bright Star Road and Bright Star Road at Bright Star Connector are expected to meet Signal Warrants 1, 2, and 3 via the conventional method under 2020 Build conditions.

Table 13 shows the 2020 signal warrant analysis via the alternate method.

Table 13: SIGNAL WARRANT ANALYSIS (ALTERNATE METHOD), 2020 BUILD CONDITIONS

WARRANT 1

INTERSECTION	DAILY VOLUME		8TH HIGHEST HOUR		CONDITION A – MET?				CONDITION B – MET?			
	MAJOR ROAD	MINOR ROAD	MAJOR ROAD	MINOR ROAD	MAJOR ROAD		MINOR ROAD		MAJOR ROAD		MINOR ROAD	
					Threshold	Met?	Threshold	Met?	Threshold	Met?	Threshold	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4896	418	274	23	(100%) 500	N	(100%) 150	N	(100%) 750	N	(100%) 75	N
Bright Star Rd & Bright Star Connector	2622	1022	147	57	(70%) 350	N	(70%) 105	N	(70%) 525	N	(70%) 53	Y
Bright Star Rd & Wood Road	3156	320	177	18	(70%) 350	N	(70%) 105	N	(70%) 525	N	(70%) 53	N
SR 8 & Bright Star Road	3350	3280	188	184	(70%) 350	N	(70%) 105	Y	(70%) 525	N	(70%) 53	Y

WARRANT 2

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED FOUR HIGHEST HOURS				Warrant 2	
			Hour 1	Hour 2	Hour 3	Hour 4	Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4896	418	9.58%	9.01%	8.45%	7.88%	100%	N
			469/40	441/38	414/35	386/33		
Bright Star Rd & Bright Star Connector	2622	1022	11.25%	10.44%	9.64%	8.83%	70%	N
			295/115	274/107	253/99	232/90		
Bright Star Rd & Wood Road	3156	320	11.25%	10.44%	9.64%	8.83%	70%	N
			355/36	330/33	304/31	279/28		
SR 8 & Bright Star Road	3350	3280	10%	9.38%	8.75%	8.12%	70%	Y
			335/328	314/308	293/287	272/266		

WARRANT 3

INTERSECTION	MAJOR ROAD	MINOR ROAD	ESTIMATED PEAK HOUR	Warrant 3	
				Threshold (See Appendix G)	Met?
SR 5 (Bill Arp Rd) & Gurley Road	4896	418	9.58%	100%	N
			469/40		
Bright Star Rd & Bright Star Connector	2622	1022	11.25%	70%	N
			295/115		
Bright Star Rd & Wood Road	3156	320	11.25%	70%	N
			355/36		
SR 8 & Bright Star Road	3350	3280	10%	70%	Y
			335/328		

The intersection of SR 8 at Bright Star Road is expected to meet Signal Warrants 1, 2, and 3 via the alternate method under 2020 Build conditions.

Capacity analysis was also conducted for each roadway segment using the *Highway Capacity Software* from McTrans. Existing and Projected Volumes were evaluated. The HCM level-of-service definitions for two lane highways (Class II) and multilane highways are summarized in Table 14.

Table 14: ROADWAY SEGMENT LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	TWO LANE HIGWAYS (CLASS II)	MULTILANE HIGHWAYS
	PERCENT TIME SPENT FOLLOWING (%)	DENSITY (PASSENGER CAR/MILE/LANE)
A	≤40	0 to 11
B	>40 - 55	>11 - 18
C	>55 - 70	>18 - 26
D	>70 - 85	>26 - 35
E	> 85	>35 – 45
F	Volume/Capacity (V/C) > 1	>45

Source: Highway Capacity Manual, Transportation Research Board, 2010

The two-lane highway segment analysis defines Level of Service based on Percent Time Spent Following (PTSF). The LOS for multilane highway segment analysis defines LOS in terms of density (passenger cars/mile/lane (pc/mi/ln).

EXISTING CONDITIONS

Table 15 summarizes the results of the roadway segment analysis under Existing conditions. Poor operating conditions are shown in gray. Roadway segment analysis reports for the Existing conditions are provided in Appendix I.

Table 15: ROADWAY SEGMENT ANALYSIS, EVALUATION OF EXISTING VOLUMES

ROADWAY	SEGMENT	AM PEAK HOUR		PM PEAK HOUR	
		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
Bright Star Rd	Bright Star Connector to Wood Rd	200 vph (NB) 235 vph (SB) 0.19 (v/c) C (62.6%)	N/A	326 vph (NB) 400 vph (SB) 0.27 (v/c) C (70.1%)	N/A
	Wood Rd to SR 8 (US 78)	204 vph (NB) 251 vph (SB) 0.17 (v/c) C (61.6%)	N/A	324 vph (NB) 352 vph (SB) 0.24 (v/c) D (67.2%)	N/A
SR 8 (US 78)	Bright Star Rd to SR 5 (Bill Arp Rd)	573 vph (EB) 456 vph (WB) 0.39(v/c) D (78.5%)	N/A	552 vph (EB) 757 vph (WB) 0.51 (v/c) D (85.2%)	N/A
SR 5 (Bill Arp Rd)	SR 8 (US 78) to Gurley Rd	222 vph (NB) 366 vph (SB) 0.25 (v/c) C (70.8%)	N/A	454 vph (NB) 301 vph (SB) 0.31 (v/c) C (74.1%)	N/A
	Gurley Rd to Bright Star Connector /Rose Ave	357 vph (NB) 372 vph (SB) 0.25 (v/c) C (65.7%)	N/A	595 vph (NB) 359 vph (SB) 0.40 (v/c) D (78.5%)	N/A
Bright Star Connector	Bright Star Rd to SR 5 (Bill Arp Rd)	185 vph (EB) A (2.4 pc/mi/ln) 90 vph (WB) A (1.2 pc/mi/ln)	N/A	235 vph (EB) A (3.0 pc/mi/ln) 215 vph (WB) A (2.8 pc/mi/ln)	N/A

The results indicate that all of the roadway segments operate at or above LOS ‘D’ under Existing conditions.

2020 NO-BUILD CONDITIONS

Table 16 summarizes the results of the roadway segment analysis under 2020 No-Build conditions. Poor operating conditions are shown in gray. Roadway segment analysis reports for the 2020 No-Build Volumes are provided in Appendix I.

Table 16: ROADWAY SEGMENT ANALYSIS, EVALUATION OF 2020 NO-BUILD VOLUMES

ROADWAY	SEGMENT	AM PEAK HOUR		PM PEAK HOUR	
		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
Bright Star Rd	Bright Star Connector to Wood Rd	225 vph (NB) 260 vph (SB) 0.18 (v/c) C (62.2%)	N/A	355 vph (NB) 425 vph (SB) 0.29 (v/c) C (70.9%)	N/A
	Wood Rd to SR 8 (US 78)	225 vph (NB) 280 vph (SB) 0.19 (v/c) C (64.3%)	N/A	345 vph (NB) 385 vph (SB) 0.26 (v/c) D (69.0%)	N/A
SR 8 (US 78)	Bright Star Rd to SR 5 (Bill Arp Rd)	615 vph (EB) 490 vph (WB) 0.41(v/c) D (80.6%)	N/A	585 vph (EB) 805 vph (WB) 0.54 (v/c) D (86.6%)	N/A
SR 5 (Bill Arp Rd)	SR 8 (US 78) to Gurley Rd	255 vph (NB) 395 vph (SB) 0.27 (v/c) C (72.0%)	N/A	485 vph (NB) 325 vph (SB) 0.32 (v/c) D (75.5%)	N/A
	Gurley Rd to Bright Star Connector /Rose Ave	395 vph (NB) 410 vph (SB) 0.28 (v/c) C (69.4%)	N/A	655 vph (NB) 405 vph (SB) 0.44 (v/c) D (81.4%)	N/A
Bright Star Connector	Bright Star Rd to SR 5 (Bill Arp Rd)	210 vph (EB) A (2.7 pc/mi/ln) 125 vph (WB) A (1.6 pc/mi/ln)	N/A	265 vph (EB) A (3.4 pc/mi/ln) 245 vph (WB) A (3.1 pc/mi/ln)	N/A

The results indicate that all of the roadway segments are expected to operate at or above LOS 'D' under 2020 No-Build conditions.

2020 BUILD CONDITIONS

Table 17 summarizes the results of the roadway segment analysis for the 2020 Build Volumes. Sections that do not meet LOS standards with the Existing Geometry are highlighted. The improvements needed to meet the LOS standards were determined and the resulting LOS is indicated. Roadway segment analysis reports for the 2020 Build Volumes are provided in Appendix I.

Table 17: ROADWAY SEGMENT ANALYSIS, EVALUATION OF 2020 BUILD VOLUMES

ROADWAY	SEGMENT	AM PEAK HOUR		PM PEAK HOUR	
		W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS	W/ EXISTING GEOMETRY	W/ RECOMMENDED IMPROVEMENTS
Bright Star Rd	Bright Star Connector to Wood Rd	339 vph (NB) 290 vph (SB) 0.23 (v/c) C (66.8%)	N/A	384 vph (NB) 510 vph (SB) 0.34 (v/c) C (76.5%)	N/A
	Wood Rd to SR 8 (US 78)	258 vph (NB) 404 vph (SB) 0.28 (v/c) D (72.0%)	N/A	437 vph (NB) 416 vph (SB) 0.30 (v/c) D (71.9%)	N/A
SR 8 (US 78)	Bright Star Rd to SR 5 (Bill Arp Rd)	635 vph (EB) 562 vph (WB) 0.55 (v/c) D (87.2%)	N/A	640 vph (EB) 823 vph (WB) 0.55 (v/c) D (87.2%)	N/A
SR 5 (Bill Arp Rd)	SR 8 (US 78) to Gurley Rd	308 vph (NB) 410 vph (SB) 0.28 (v/c) C (70.6%)	N/A	499 vph (NB) 366 vph (SB) 0.34 (v/c) D (76.1%)	N/A
	Gurley Rd to Bright Star Connector /Rose Ave	448 vph (NB) 425 vph (SB) 0.30 (v/c) C (71.9%)	N/A	669 vph (NB) 446 vph (SB) 0.45 (v/c) D (82.6%)	N/A
Bright Star Connector	Bright Star Rd to SR 5 (Bill Arp Rd)	224 vph (EB) A (2.9 pc/mi/ln) 179 vph (WB) A (2.4 pc/mi/ln)	N/A	305 vph (EB) A (3.9 pc/mi/ln) 259 vph (WB) A (3.3 pc/mi/ln)	N/A

The results indicate that all of the roadway segments are expected to operate at or above LOS 'D' under 2020 Build conditions.

This section summarizes the findings and recommendations for No-Build and Build Conditions.

REQUIRED IMPROVEMENTS, 2020 NO-BUILD CONDITIONS

Table 18 summarizes the improvements necessary to achieve the LOS 'D' standard for the No-Build Condition and Figure 14 illustrates these improvements graphically.

Table 18: IMPROVEMENTS REQUIRED FOR THE NO-BUILD CONDITION

INTERSECTION/SEGMENT	SUMMARY OF RECOMMENDED IMPROVEMENTS TO REACH LOS 'D' STANDARD
Bright Star Rd & SR 8	Install Traffic Signal Control
Bright Star Rd & Bright Star Connector	Install Roundabout or Traffic Signal (Refer to Table 7 on Page 20 for operational analyses.)

It is recommended that the Bright Star Road at SR 8 intersection be signalized and operate in coordination with the intersection of SR 8 at SR 5 (Bill Arp Road), which is already signalized. Since these intersections are closely spaced (roughly 300 ft.), they should be operated with one controller and use the operation as shown in Figure 13 below.

Figure 13: DESIGN OF SIGNAL CONTROL AT BRIGHT STAR RD @ SR 8 AND SR 8 @ SR 5 (BILL ARP RD)

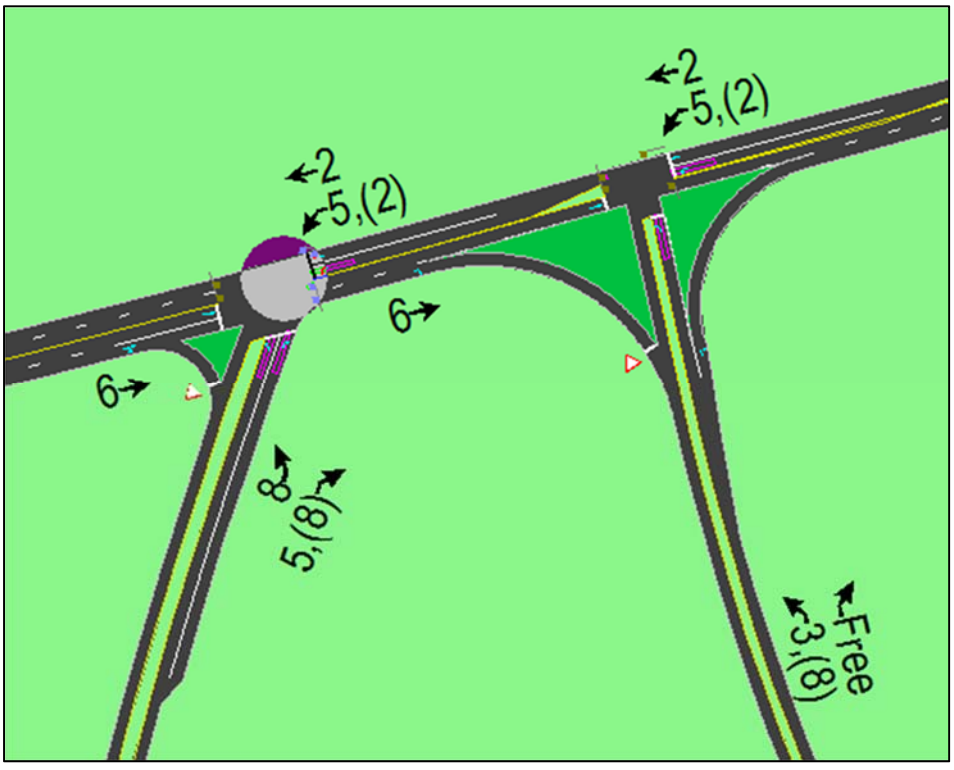
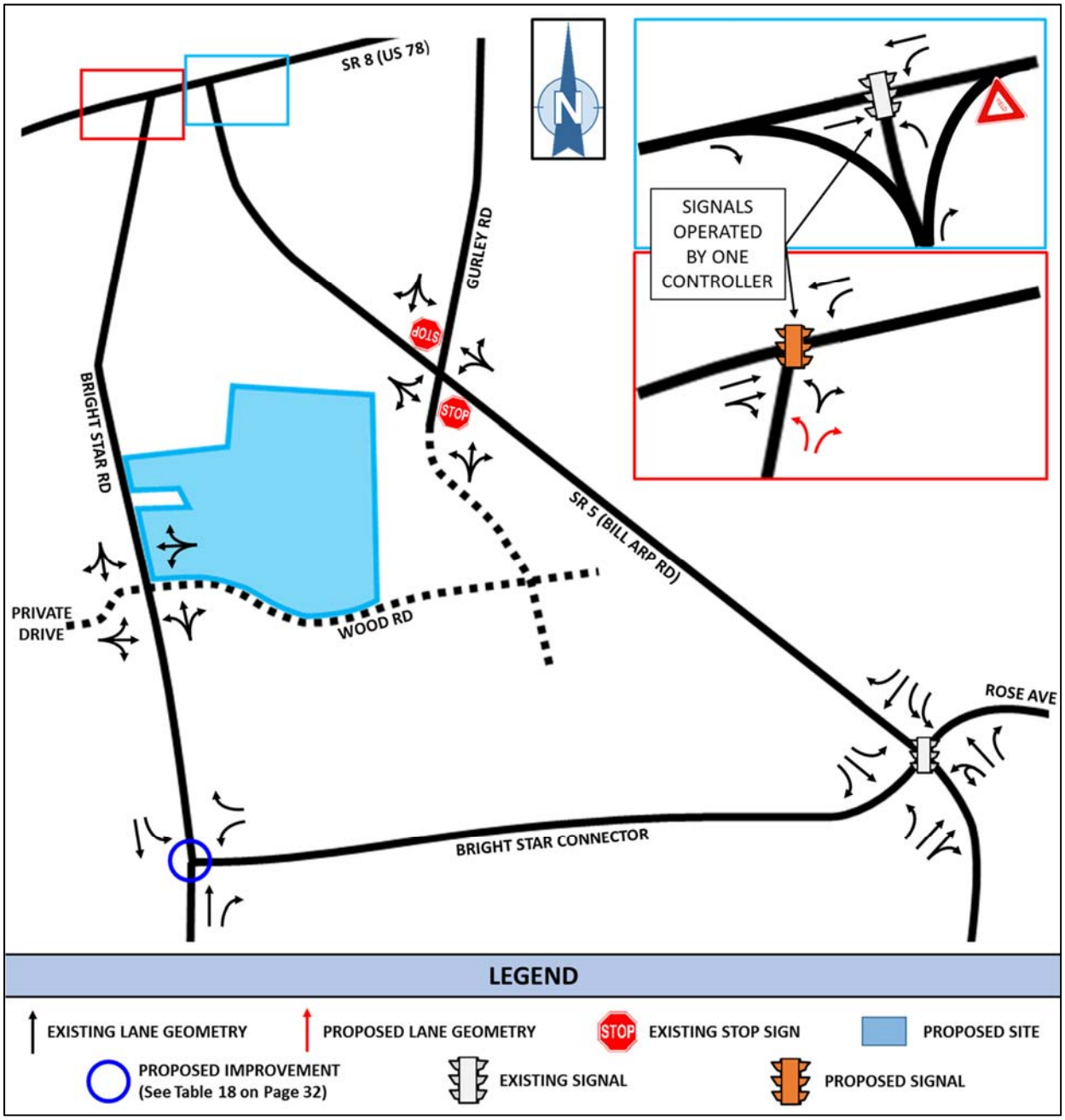


Figure 14: IMPROVEMENTS TO MEET MINIMUM STANDARDS, 2020 NO-BUILD VOLUMES



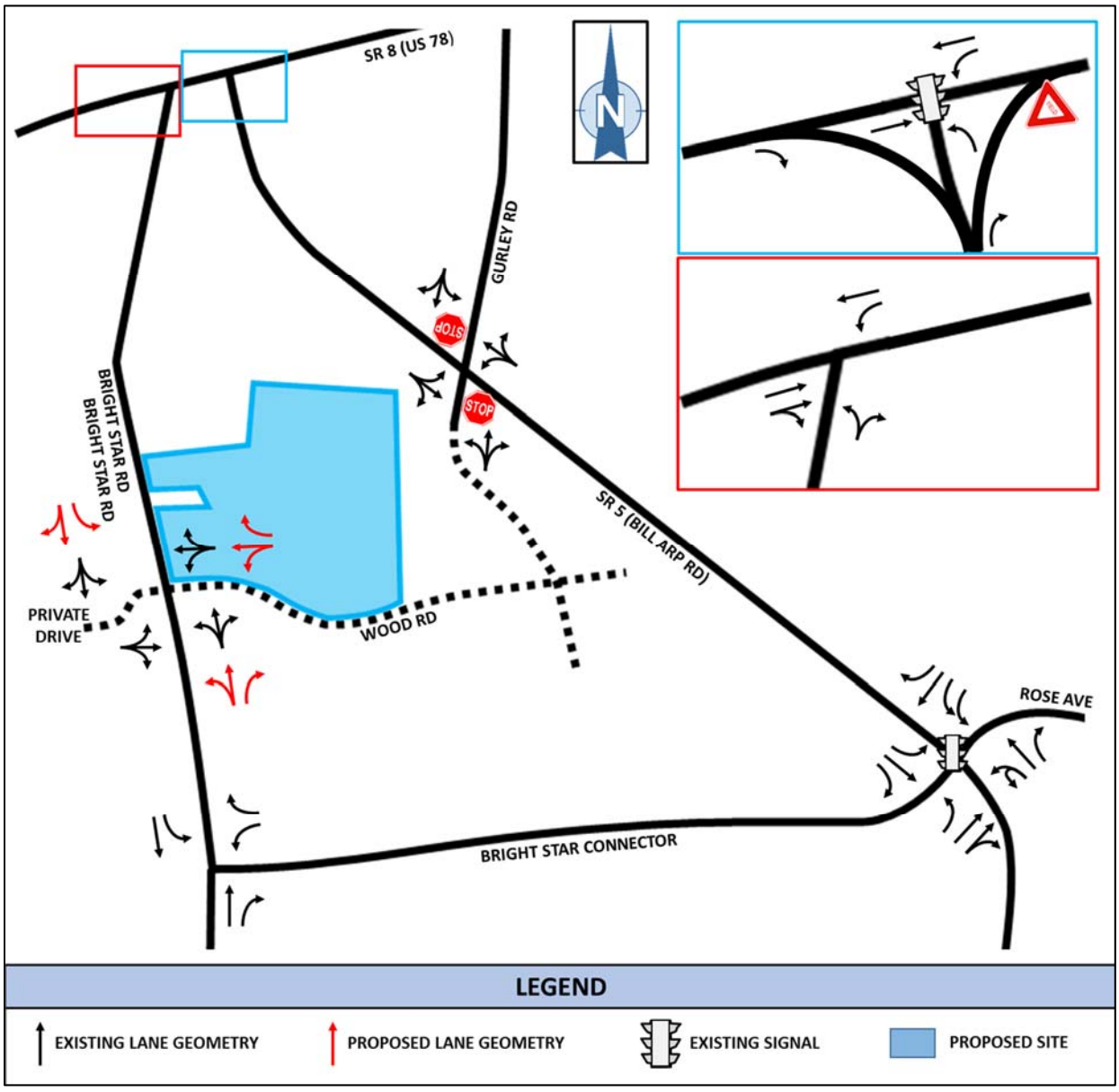
REQUIRED IMPROVEMENTS, 2020 BUILD CONDITIONS

Table 19 summarizes the improvements necessary to achieve the LOS 'D' standard for the Build Condition and Figure 15 shows these improvements visually. These improvements are in addition to the improvements shown in Table 18 required for the No-Build Condition.

Table 19: IMPROVEMENTS REQUIRED FOR THE BUILD CONDITION

INTERSECTION/SEGMENT	SUMMARY OF RECOMMENDED IMPROVEMENTS TO REACH LOS 'D' STANDARD
Bright Star Rd & Wood Rd	Install NB-R, SB-L, and WB-R Turn Lanes

Figure 15: IMPROVEMENTS TO MEET LOS STANDARDS, 2020 BUILD VOLUMES



APPENDICES

APPENDIX A
LETTER OF UNDERSTANDING

December 13, 2016

Dan Lacz
SL Bright Star LLC
c/o Silverman Group
788 Morris Turnpike
Short Hills, New Jersey 07078

RE: **DRI 2653 SL Bright Star**

Dear Mr. Lacz:

The purpose of this letter is to document the discussions during the Pre-Review and Methodology Meeting held at ARC's office on December 5, 2016 and DCA Initial Information Form filed on November 29, 2016 regarding **DRI 2653 SL Bright Star.** Some of the following items were discussed in this meeting and should assist you and your consultant team in preparing the DRI Review Package.

PROJECT OVERVIEW

- The project is located in the City of Douglasville. The proposed development is located on the eastern side of Bright Star Road, north of the Bright Star Connector.
- The DRI trigger for this development is a Rezoning Application.
- The proposed development is expected to be up to 591,250 square feet of Warehouse/Distribution space in multiple buildings.
- Proposed access is onto Wood Road which intersects Bright Star Road on the southwest side of the side. Alternative direct access is being explored towards Bill Arp Road/SR 5.
- Trip generation is estimated at 2,502 gross daily trips.
- The projected build out for this DRI is 2020.
- The applicant is applying for approval under GRTA's expedited review process under Limited Trip Generation for more than 1,000 and less than 3,000 gross daily trips.

METHODOLOGY

- All intersections identified as within the study network shall be analyzed during the AM and PM peak hours for (1) existing conditions, (2) future "no-build" conditions [may not be applicable for the site driveways], and (3) future "build" conditions. This DRI shall be reviewed in one phase to be completed by 2020.
- Capacity analysis shall be based on turning movement counts collected not more than 12-months prior to the date of the actual DRI submittal to GRTA. As appropriate, pedestrian counts and heavy vehicle counts shall be collected with vehicle counts and considered within the capacity analysis. Turning movement counts shall be collected while local schools are in session. Ordinarily traffic counts are not permitted between the week of Thanksgiving and the second week of January or any week of a major holiday. However as the site is not in close proximity to any school or retail center, traffic counts are permitted for the early weeks of December.

- A 1.0% background traffic growth rate shall be used for all roadways over three years. This growth rates is intended to include the surrounding DRIs previously reviewed. The prior DRIs do not share the same truck distribution but may share employee vehicular trips in the general area.
- The level of service standard for all analyses shall be LOS D.
- No trip reductions are allowed.
- Default values should not be assumed in the traffic modeling. Existing conditions shall be taken into account.
- The applicant shall research TIP, STIP, RTP, and GDOT's construction work program, as well as any local government plans (SPLOST, CIP, etc.), to determine the open-to-traffic date, sponsor, cost of the project, funding source(s), for future roadway projects in the project vicinity. This information shall be included within the traffic analysis.

STUDY NETWORK

1. Bright Star Road at Wood Road/Site Driveway
2. SR 8/US 78 at Bright Star Road
3. SR 8/US 78 at SR 5/Bill Arp Road
4. SR 5/Bill Arp Road at Gurley Road
5. SR 5/Bill Arp Road at Bright Star Connector/Rose Ave
6. Bright Star Road at Bright Star Connector

ADDITIONAL INFORMATION

Every roadway segment and intersection listed above will be analyzed for "required improvements." If the existing LOS for the segment or intersection is below the applicable level of service for a particular time period (e.g., A.M. peak period, P.M. peak period, etc.), then the measured LOS service for that segment and time periods is the standard by which the "base" and "future" traffic conditions will be designed. For example, if the County's LOS standard is LOS D, but an intersection or segment currently operates at LOS E for a certain peak period, then the LOS standard for that intersection or segment for "base" and "future" conditions becomes LOS E (only for that intersection and only for that peak period). The "base" is the phase year traffic without the development traffic (also called future "no-build" conditions) and the "future" is the phase year with the development traffic (also called future "build" conditions). As required in the technical guidelines, specific "required improvements" will be identified to bring the "base" LOS and "future" LOS for every roadway segment and intersection up to the applicable LOS standard. If the existing LOS for the segment or intersection is LOS F, then the future "no-build' and future "build" LOS standard will be LOS E. The improvements required to achieve the desired LOS standard will be provided in a table and graphic within the study. The traffic study should indicate the existing roadway laneage at each studied intersection as well as the laneage required (to meet the LOS standard) for future "no-build" and future "build" conditions. The improvements may include both programmed improvements and improvements identified in the study.

The planned and programmed improvement should indicate the project sponsor, the anticipated funding by source (federal, state, city/county, developer, CID, etc.), the year open-to-traffic, and estimate of the total project cost. All other required improvements identified in the study should, to the extent known, identify the cost, sponsor, funding, and timing. If any of these elements are not known, please state as "unknown."

The future "no-build" and the future "build" analyses should NOT automatically include/assume the additional lanes/capacity associated with planned and programmed improvement projects unless those roadway projects are currently under construction. Instead, the traffic consultant should recommend the additional laneage required to satisfy the level of service standard.

DRI REVIEW PACKAGE CHECKLIST

Please use the DRI Review Package Checklist to help you prepare your GRTA DRI Review Package for expedited review of your application. The Checklist reflects the understandings set forth in this letter, and is incorporated into this letter by reference.

The site plan shall be prepared in accordance with Section 4-104 of the DRI Review Package Technical Guidelines and it shall be dated, and shall be at a scale of 1"= 200' or larger (showing more detail). The site plan shall be consistent with GRTA's Site Plan Information Guidelines, which represents the minimum required information on site plans.

The applicant shall indicate on the site plans all adjacent land uses, current zoning, and future land use as indicated on the future land use map. Additionally, all existing and proposed sidewalks, existing and proposed pedestrian trails, and existing and proposed roadway laneage should be indicated on the site plan.

DRI REVIEW PACKAGE SUBMITTAL

At the time you are ready to submit your DRI Review Package to GRTA, please note the following:

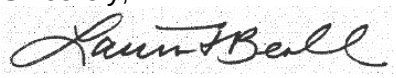
- All Initial Information forms should be filed online with the GA Department of Community Affairs (DCA).
- Provide one (1) paper copy of all materials:
  - Transportation Analysis
  - Site Plan
- Provide one (1) CD-ROM with electronic versions of all submittal documents:
  - Provide a PDF of each document
  - Provide the native format for each document
    - .dwg is the preferred CAD format (AutoCAD)
    - .doc is the preferred word processing format (Word)
    - .xls is the preferred spreadsheet format (Excel)
    - .sy6, .sy7, .sy8 or .sy9 is the preferred capacity analysis format (Synchro)

As part of the completeness certification process, please have your consultant forward one copy of the completed GRTA DRI Review Package (transportation analysis, site plan, CD) to the GDOT District Office, Regional Commission and local government Planning & Development and/or Transportation group(s) (contact information provided below). GRTA shall be copied on each of the transmittal letters.

GDOT DISTRICT 7	**DOUGLAS CO DOT**	**CITY OF DOUGLASVILLE**	**ATLANTA REGIONAL COMMISSION**
Paul DeNard 5025 New Peachtree Rd, NE Chamblee, GA 30341	Randy Hulsey 8700 Hospital Drive Douglasville, GA 30134	Michelle Wright 6695 Church Street Douglasville, GA 30134	Andrew Smith 40 Courtland Street, NE Atlanta, Georgia 30303

We encourage your consultant team to verify the items covered in this letter prior to compiling the submittal materials. If you have any questions, please feel free to contact me directly at 404-463-3068 (lbeall@grta.org).

Sincerely,



Laura F. Beall, AICP
Program Manager

cc: Jon West, DCA
Andrew Smith, ARC
Paul DeNard, GDOT District 7
Randy Hulsey, Douglas Co DOT
Michelle Wright, City of Douglasville
Howard Ray, Hughes Ray
Speedy Boutwell, Wilburn Engineering

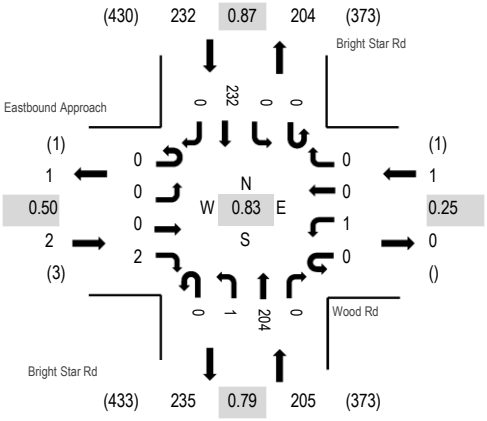
APPENDIX B
TURNING MOVEMENT COUNT DATA

Turning Movement Counts: AM Peak Hour

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

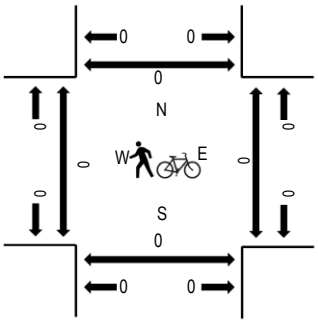
Location: 1 Bright Star Rd & Wood Rd AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Eastbound Approach Eastbound				Wood Rd Westbound				Bright Star Rd Northbound				Bright Star Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	0	0	0	0	0	0	0	0	40	0	0	0	42	0	82	410	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	35	0	0	0	44	0	79	417	0	0	0	0
7:30 AM	0	0	0	1	0	1	0	0	0	0	52	0	0	0	62	0	116	440	0	0	0	0
7:45 AM	0	0	0	1	0	0	0	0	0	1	64	0	0	0	67	0	133	420	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	44	0	0	0	45	0	89	397	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	44	0	0	0	58	0	102		0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	45	0	0	0	51	0	96		0	0	0	0
8:45 AM	0	1	0	0	0	0	0	0	0	0	48	0	0	0	61	0	110		0	0	0	0

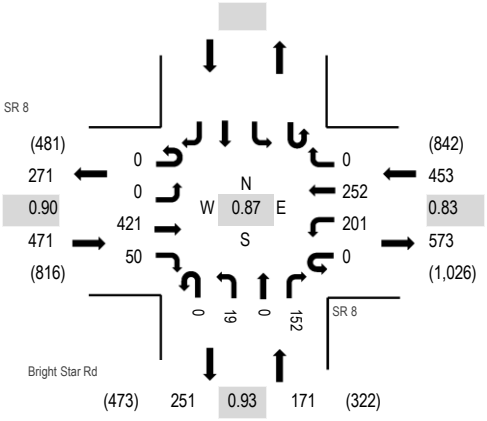
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	2	0	1	0	0	0	1	196	0	0	0	215	0	415
Mediums	0	0	0	0	0	0	0	0	0	0	8	0	0	0	17	0	25
Total	0	0	0	2	0	1	0	0	0	1	204	0	0	0	232	0	440

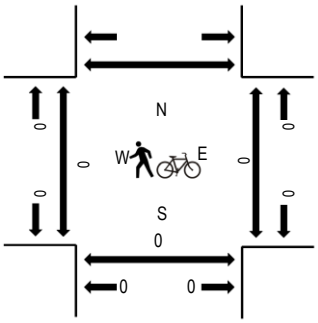
All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

Location: 2 Bright Star Rd & SR 8 AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles in Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

Interval Start Time	SR 8 Eastbound				SR 8 Westbound				Bright Star Rd Northbound				Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	70	7	0	46	43	0	0	2	0	32					200	1,022	0	0	0	
7:15 AM	0	0	97	11	0	47	48	0	0	0	0	32					235	1,069	0	0	0	
7:30 AM	0	0	100	11	0	53	69	0	0	4	0	36					273	1,095	0	0	0	
7:45 AM	0	0	107	24	0	65	72	0	0	4	0	42					314	1,027	0	0	0	
8:00 AM	0	0	110	9	0	34	49	0	0	5	0	40					247	958	0	0	0	
8:15 AM	0	0	104	6	0	49	62	0	0	6	0	34					261		0	0	0	
8:30 AM	0	0	61	10	0	41	56	0	0	5	0	32					205		0	0	0	
8:45 AM	0	0	84	5	0	55	53	0	0	3	0	45					245		0	0	0	

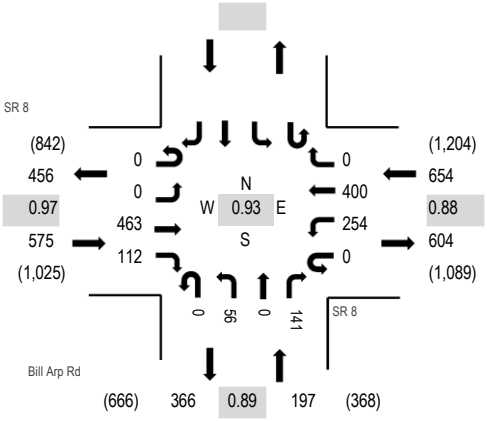
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	5	0	0	0	5	0	0	0	0	1					11
Lights	0	0	387	47	0	194	220	0	0	17	0	144					1,009
Mediums	0	0	29	3	0	7	27	0	0	2	0	7					75
Total	0	0	421	50	0	201	252	0	0	19	0	152					1,095

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

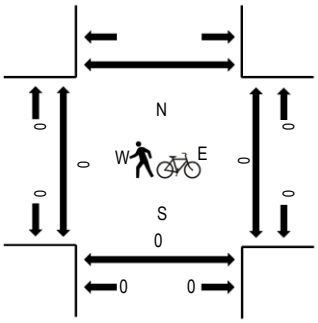
Location: 3 Bill Arp Rd & SR 8 AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SR 8 Eastbound				SR 8 Westbound				Bill Arp Rd Northbound				Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	81	19	0	41	73	0	0	11	0	34					259	1,354	0	0	0	
7:15 AM	0	0	109	20	0	84	80	0	0	17	0	32					342	1,401	0	0	0	
7:30 AM	0	0	110	31	0	62	107	0	0	13	0	46					369	1,426	0	0	0	
7:45 AM	0	0	117	31	0	65	120	0	0	21	0	30					384	1,310	0	0	0	
8:00 AM	0	0	117	24	0	45	70	0	0	13	0	37					306	1,243	0	0	0	
8:15 AM	0	0	119	26	0	82	103	0	0	9	0	28					367		0	0	0	
8:30 AM	0	0	75	19	0	43	78	0	0	15	0	23					253		0	0	0	
8:45 AM	0	0	108	19	0	55	96	0	0	16	0	23					317		0	0	0	

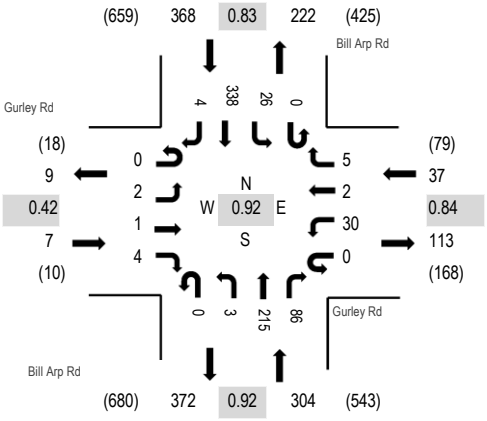
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	3	3	0	1	2	0	0	2	0	1					12
Lights	0	0	431	98	0	249	370	0	0	48	0	133					1,329
Mediums	0	0	29	11	0	4	28	0	0	6	0	7					85
Total	0	0	463	112	0	254	400	0	0	56	0	141					1,426

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

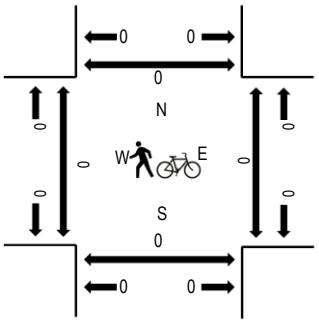
Location: 4 Bill Arp Rd & Gurley Rd AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Gurley Rd Eastbound				Gurley Rd Westbound				Bill Arp Rd Northbound				Bill Arp Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM	0	0	0	0	0	11	0	1	0	2	54	14	0	4	53	0	139	689	0	0	0	0
7:15 AM	0	0	0	0	0	3	0	0	0	0	65	14	0	6	91	0	179	701	0	0	0	0
7:30 AM	0	0	0	0	0	5	0	2	0	3	64	19	0	9	81	0	183	716	0	0	0	0
7:45 AM	0	0	0	1	0	9	0	1	0	0	58	20	0	11	88	0	188	659	0	0	0	0
8:00 AM	0	0	0	0	0	7	0	1	0	0	50	25	0	3	64	1	151	602	0	0	0	0
8:15 AM	0	2	1	3	0	9	2	1	0	0	43	22	0	3	105	3	194		0	0	0	0
8:30 AM	0	1	0	2	0	10	1	3	0	3	39	8	0	1	57	1	126		0	0	0	0
8:45 AM	0	0	0	0	0	7	0	6	0	1	34	5	0	3	74	1	131		0	0	0	0

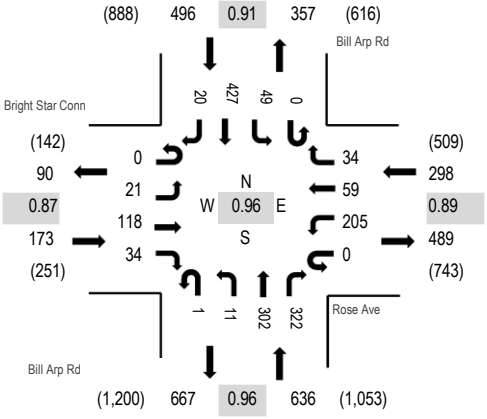
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	1	0	0	0	0	3	2	0	0	5	0	11
Lights	0	2	1	4	0	28	2	5	0	3	203	83	0	26	310	4	671
Mediums	0	0	0	0	0	1	0	0	0	0	9	1	0	0	23	0	34
Total	0	2	1	4	0	30	2	5	0	3	215	86	0	26	338	4	716

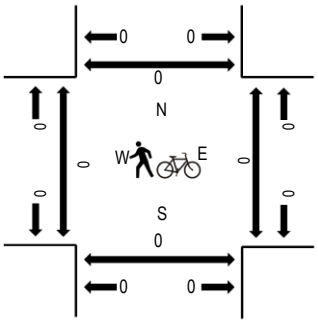
All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

Location: 5 Bill Arp Rd & Rose Ave AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Peak Hour - Pedestrians/Bicycles in Crosswalk



Note: Total study counts contained in parentheses.

Traffic Counts

Interval Start Time	Bright Star Conn Eastbound				Rose Ave Westbound				Bill Arp Rd Northbound				Bill Arp Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	2	2	8	0	40	3	4	0	1	56	23	0	5	84	2	230	1,350	0	0	0	0
7:15 AM	0	0	18	4	0	28	8	6	0	1	76	56	0	9	93	5	304	1,506	0	0	0	1
7:30 AM	0	5	24	11	0	44	13	5	0	1	82	76	0	10	118	8	397	1,603	0	0	0	0
7:45 AM	0	8	24	5	0	54	22	8	0	7	77	81	0	17	110	6	419	1,509	0	0	0	0
8:00 AM	0	3	37	6	0	52	13	9	1	3	80	82	0	12	83	5	386	1,351	0	0	0	0
8:15 AM	0	5	33	12	0	55	11	12	0	0	63	83	0	10	116	1	401		0	0	0	0
8:30 AM	0	2	20	5	0	53	6	5	0	5	56	48	0	7	94	2	303		0	0	0	0
8:45 AM	0	2	11	4	0	40	11	7	0	6	43	46	0	9	80	2	261		0	0	0	0

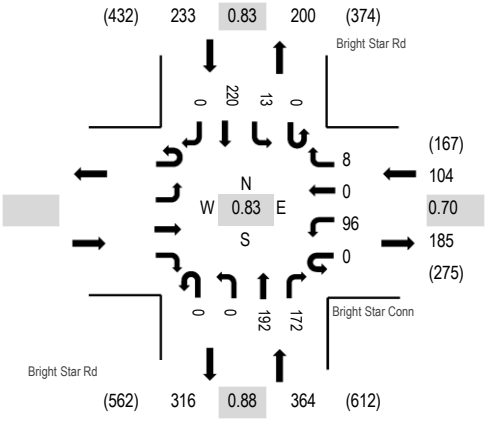
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	2	0	0	0	0	6	3	0	0	5	0	16
Lights	0	19	118	29	0	199	59	32	1	10	286	312	0	44	406	20	1,535
Mediums	0	2	0	5	0	4	0	2	0	1	10	7	0	5	16	0	52
Total	0	21	118	34	0	205	59	34	1	11	302	322	0	49	427	20	1,603

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

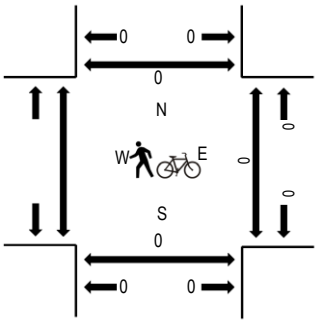
Location: 6 Bright Star Rd & Bright Star Conn AM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 07:30 AM - 08:30 AM
Peak 15-Minutes: 07:45 AM - 08:00 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Eastbound				Bright Star Conn Westbound				Bright Star Rd Northbound				Bright Star Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
7:00 AM					0	7	0	2	0	0	41	12	0	1	38	0	101	617		0	0	0
7:15 AM					0	17	0	2	0	0	37	29	0	1	47	0	133	676		0	0	0
7:30 AM					0	24	0	2	0	0	48	37	0	4	57	0	172	701		0	0	0
7:45 AM					0	35	0	3	0	0	61	42	0	3	67	0	211	658		0	0	0
8:00 AM					0	22	0	2	0	0	42	48	0	1	45	0	160	594		0	0	0
8:15 AM					0	15	0	1	0	0	41	45	0	5	51	0	158			0	0	0
8:30 AM					0	12	0	2	0	0	41	23	0	3	48	0	129			0	0	0
8:45 AM					0	18	0	3	0	0	46	19	0	2	59	0	147			0	0	0

Peak Rolling Hour Flow Rates

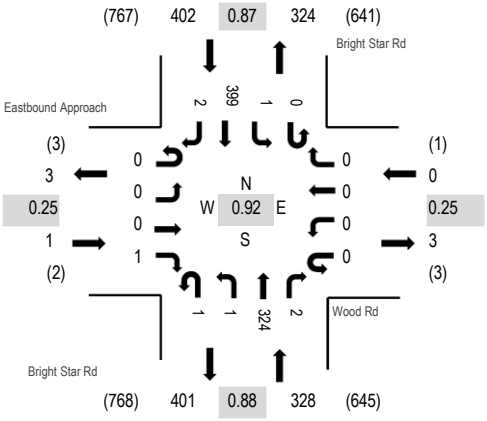
Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks					0	0	0	0	0	0	0	0	0	0	0	0	0
Lights					0	96	0	8	0	0	182	169	0	8	204	0	667
Mediums					0	0	0	0	0	0	10	3	0	5	16	0	34
Total					0	96	0	8	0	0	192	172	0	13	220	0	701

Turning Movement Counts: PM Peak Hour

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

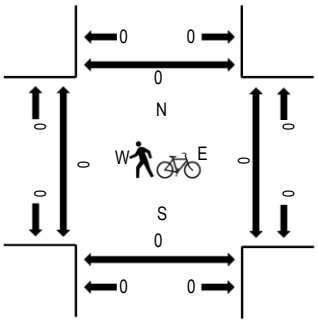
Location: 1 Bright Star Rd & Wood Rd PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Eastbound Approach Eastbound				Wood Rd Westbound				Bright Star Rd Northbound				Bright Star Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:30 PM	0	0	0	0	0	0	0	0	0	0	92	0	0	0	106	0	198	731	0	0	0	0
4:45 PM	0	0	0	1	0	0	0	0	0	0	64	0	0	1	89	1	156	731	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	1	74	0	0	0	116	1	192	722	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	1	0	94	2	0	0	88	0	185	717	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	88	0	0	0	110	0	198	684	0	0	0	0
5:45 PM	0	0	0	1	0	1	0	0	0	0	63	0	0	0	82	0	147		0	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	0	0	98	0	0	0	89	0	187		0	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	68	0	0	0	84	0	152		0	0	0	0

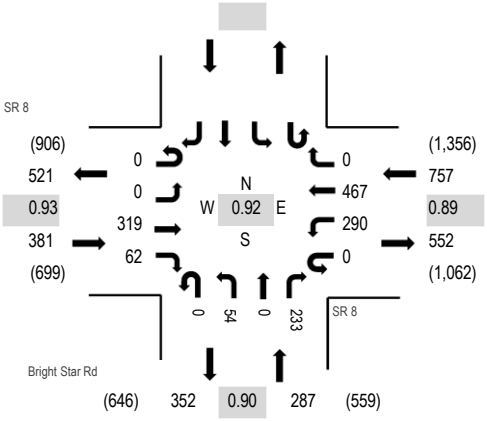
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lights	0	0	0	1	0	0	0	0	1	1	320	2	0	1	389	2	717
Mediums	0	0	0	0	0	0	0	0	0	0	4	0	0	0	10	0	14
Total	0	0	0	1	0	0	0	0	1	1	324	2	0	1	399	2	731

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

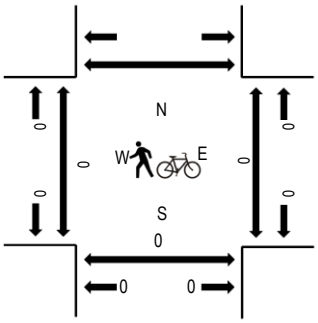
Location: 2 Bright Star Rd & SR 8 PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SR 8 Eastbound				SR 8 Westbound				Bright Star Rd Northbound				Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:30 PM	0	0	66	12	0	70	93	0	0	9	0	56					306	1,343	0	0	0	
4:45 PM	0	0	89	13	0	63	82	0	0	13	0	42					302	1,418	0	0	0	
5:00 PM	0	0	88	15	0	69	144	0	0	11	0	61					388	1,425	0	0	0	
5:15 PM	0	0	87	23	0	67	96	0	0	12	0	62					347	1,346	0	0	0	
5:30 PM	0	0	77	15	0	81	132	0	0	15	0	61					381	1,271	0	0	0	
5:45 PM	0	0	67	9	0	73	95	0	0	16	0	49					309		0	0	0	
6:00 PM	0	0	66	9	0	59	92	0	0	9	0	74					309		0	0	0	
6:15 PM	0	0	59	4	0	64	76	0	0	11	0	58					272		0	0	0	

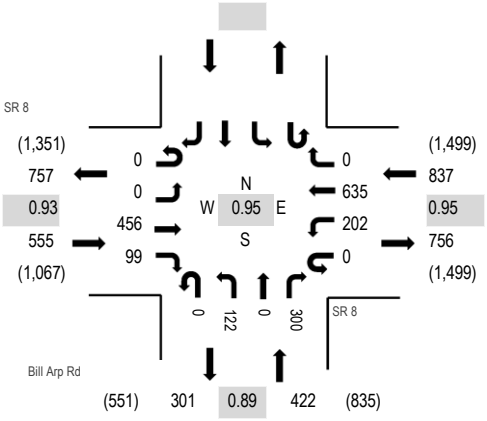
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	7	1	0	2	1	0	0	0	0	1					12
Lights	0	0	306	61	0	281	455	0	0	54	0	227					1,384
Mediums	0	0	6	0	0	7	11	0	0	0	0	5					29
Total	0	0	319	62	0	290	467	0	0	54	0	233					1,425

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

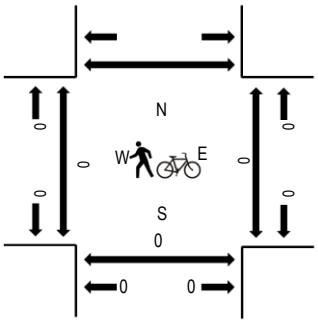
Location: 3 Bill Arp Rd & SR 8 PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	SR 8 Eastbound				SR 8 Westbound				Bill Arp Rd Northbound				Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:30 PM	0	0	105	17	0	52	129	0	0	37	0	86					426	1,723	0	0	0	
4:45 PM	0	0	113	20	0	28	112	0	0	30	0	71					374	1,757	0	0	0	
5:00 PM	0	0	116	23	0	47	164	0	0	49	0	78					477	1,814	0	0	0	
5:15 PM	0	0	128	25	0	56	137	0	0	25	0	75					446	1,722	0	0	0	
5:30 PM	0	0	115	28	0	38	182	0	0	28	0	69					460	1,678	0	0	0	
5:45 PM	0	0	97	23	0	61	152	0	0	20	0	78					431		0	0	0	
6:00 PM	0	0	114	15	0	49	128	0	0	23	0	56					385		0	0	0	
6:15 PM	0	0	103	25	0	44	120	0	0	15	0	95					402		0	0	0	

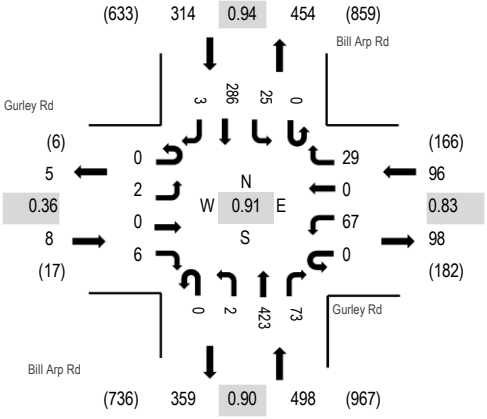
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	2	0	0	0	1	0	0	2	0	1					6
Lights	0	0	446	83	0	201	619	0	0	117	0	298					1,764
Mediums	0	0	8	16	0	1	15	0	0	3	0	1					44
Total	0	0	456	99	0	202	635	0	0	122	0	300					1,814

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

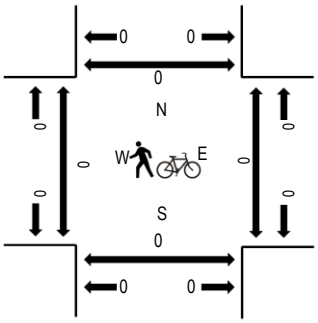
Location: 4 Bill Arp Rd & Gurley Rd PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Gurley Rd Eastbound				Gurley Rd Westbound				Bill Arp Rd Northbound				Bill Arp Rd Southbound				Total	Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:30 PM	0	0	0	2	0	20	0	9	0	1	121	17	0	10	70	1	251	916	0	0	0	0
4:45 PM	0	0	0	1	0	18	0	9	0	0	107	14	0	3	55	0	207	896	0	0	0	0
5:00 PM	0	2	0	2	0	18	0	8	0	1	105	22	0	7	71	2	238	913	0	0	0	0
5:15 PM	0	0	0	1	0	11	0	3	0	0	90	20	0	5	90	0	220	870	0	0	0	0
5:30 PM	0	0	0	1	0	15	0	3	0	1	103	20	0	2	86	0	231	867	0	0	0	0
5:45 PM	0	0	0	1	0	9	0	3	0	0	99	18	0	3	91	0	224		0	0	0	0
6:00 PM	0	1	4	2	0	17	0	2	0	0	88	15	0	0	66	0	195		0	0	0	0
6:15 PM	0	0	0	0	0	19	0	2	0	0	104	21	0	1	70	0	217		0	0	0	0

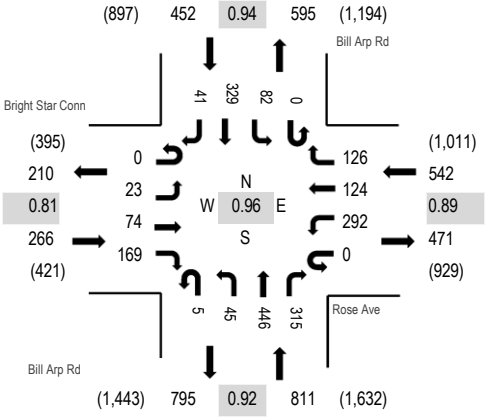
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6
Lights	0	2	0	6	0	67	0	28	0	2	408	72	0	25	277	3	890
Mediums	0	0	0	0	0	0	0	1	0	0	11	1	0	0	7	0	20
Total	0	2	0	6	0	67	0	29	0	2	423	73	0	25	286	3	916

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

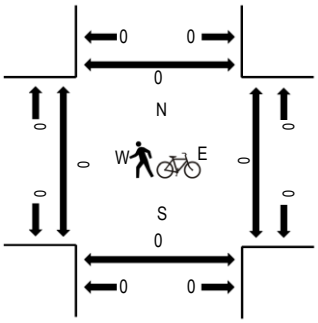
Location: 5 Bill Arp Rd & Rose Ave PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 05:00 PM - 06:00 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Bright Star Conn Eastbound				Rose Ave Westbound				Bill Arp Rd Northbound				Bill Arp Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:30 PM	0	5	29	7	0	76	26	17	1	9	136	76	0	14	92	9	497	2,008	0	0	0	0
4:45 PM	0	3	24	5	0	57	33	29	2	7	112	70	1	17	70	9	439	2,028	2	0	0	0
5:00 PM	0	12	27	40	0	87	29	36	3	6	112	78	0	21	75	13	539	2,071	0	0	0	0
5:15 PM	0	5	22	55	0	52	45	25	0	9	110	87	0	26	82	15	533	1,998	0	0	0	0
5:30 PM	0	2	11	50	0	70	24	34	1	22	117	80	0	19	81	6	517	1,953	0	0	0	0
5:45 PM	0	4	14	24	0	83	26	31	1	8	107	70	0	16	91	7	482		0	0	0	0
6:00 PM	0	7	28	12	0	58	20	20	1	18	114	68	0	19	98	3	466		0	0	0	0
6:15 PM	0	5	22	8	0	73	34	26	0	9	124	74	0	17	88	8	488		0	0	0	0

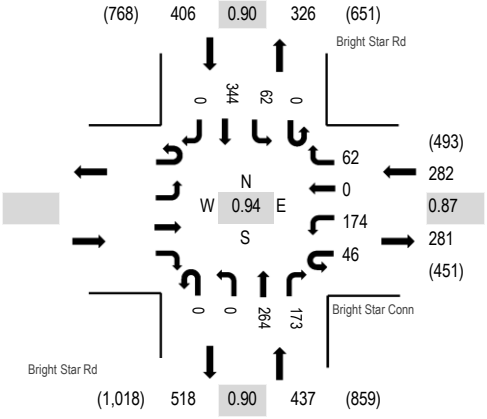
Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	7
Lights	0	23	74	168	0	291	122	126	5	45	436	311	0	80	324	37	2,042
Mediums	0	0	0	1	0	1	2	0	0	0	7	4	0	2	1	4	22
Total	0	23	74	169	0	292	124	126	5	45	446	315	0	82	329	41	2,071

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

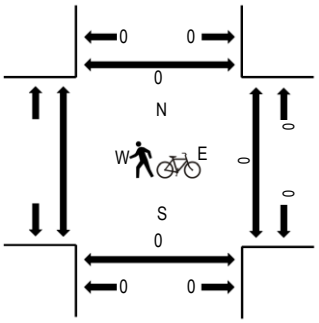
Location: 6 Bright Star Rd & Bright Star Conn PM
Date and Start Time: Tuesday, December 13, 2016
Peak Hour: 04:45 PM - 05:45 PM
Peak 15-Minutes: 05:00 PM - 05:15 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles in Crosswalk



Traffic Counts

Interval Start Time	Eastbound				Bright Star Conn Westbound				Bright Star Rd Northbound				Bright Star Rd Southbound					Rolling Hour	Pedestrain Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total		West	East	South	North
4:30 PM					0	39	0	11	0	0	78	34	0	8	97	0	267	1,112		0	0	0
4:45 PM					0	54	0	8	0	0	60	35	0	3	91	0	251	1,125		0	0	0
5:00 PM					13	37	0	11	0	0	66	60	0	23	90	0	300	1,093		0	0	0
5:15 PM					12	48	0	21	0	0	72	48	0	15	78	0	294	1,066		0	0	0
5:30 PM					21	35	0	22	0	0	66	30	0	21	85	0	280	1,008		0	0	0
5:45 PM					6	33	0	10	0	0	52	31	0	10	77	0	219			0	0	0
6:00 PM					0	50	0	10	0	0	89	36	0	8	80	0	273			0	0	0
6:15 PM					0	45	0	7	0	0	68	34	0	3	79	0	236			0	0	0

Peak Rolling Hour Flow Rates

Vehicle Type	Eastbound				Westbound				Northbound				Southbound				Total
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	
Articulated Trucks					0	0	0	0	0	0	0	0	0	0	0	0	0
Lights					46	173	0	60	0	0	262	171	0	61	340	0	1,113
Mediums					0	1	0	2	0	0	2	2	0	1	4	0	12
Total					46	174	0	62	0	0	264	173	0	62	344	0	1,125

APPENDIX C
TRIP GENERATION DATA

Trip Generation Summary

Alternative: Alternative 1
Phase:
Project: Bright StarDistribution Center

Open Date: 11/15/2016
Analysis Date: 11/15/2016

ITE	Land Use		Weekday Average Daily Trips *	Enter	Exit	Total	Weekday AM Peak Hour of Adjacent Street Traffic *	Enter	Exit	Total	Weekday PM Peak Hour of Adjacent Street Traffic *	Enter	Exit	Total
150	Phase 1 - 2017			538	537	1075		107	29	136		27	79	106
	247.5	Gross Floor Area 1000 SF												
150	Phase 2 - 2020			713	713	1426		129	34	163		33	98	131
	343.7	Gross Floor Area 1000 SF												
Unadjusted Volume				1251	1250	2501		236	63	299		60	177	237
Internal Capture Trips				0	0	0		0	0	0		0	0	0
Pass-By Trips				0	0	0		0	0	0		0	0	0
Volume Added to Adjacent Streets				1251	1250	2501		236	63	299		60	177	237

Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012
TRIP GENERATION 2014, TRAFFICWARE, LLC

APPENDIX D
CAPACITY ANALYSIS: EXISTING CONDITIONS

Existing Conditions, AM Peak Hour

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	2	1	0	0	1	204	0	0	232	0
Future Volume (Veh/h)	0	0	2	1	0	0	1	204	0	0	232	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.50	0.25	0.92	0.92	0.25	0.80	0.92	0.92	0.87	0.92
Hourly flow rate (vph)	0	0	4	4	0	0	4	255	0	0	267	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	530	530	267	534	530	255	267			255		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	530	530	267	534	530	255	267			255		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	99	100	100	100			100		
cM capacity (veh/h)	459	453	777	457	456	789	1308			1310		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	4	259	267
Volume Left	0	4	4	0
Volume Right	4	0	0	0
cSH	777	457	1308	1310
Volume to Capacity	0.01	0.01	0.00	0.00
Queue Length 95th (ft)	0	1	0	0
Control Delay (s)	9.7	13.0	0.1	0.0
Lane LOS	A	B	A	
Approach Delay (s)	9.7	13.0	0.1	0.0
Approach LOS	A	B		

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	22.2%	ICU Level of Service	A	
Analysis Period (min)	15			

2: Bright Star Road & SR 8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	421	50	201	252	19	152
Future Volume (Veh/h)	421	50	201	252	19	152
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.52	0.77	0.88	0.79	0.90
Hourly flow rate (vph)	439	96	261	286	24	169
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked						
vC, conflicting volume			439		1295	268
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			439		1295	268
tC, single (s)			4.2		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			76		78	77
cM capacity (veh/h)			1110		109	722

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	293	242	261	286	193
Volume Left	0	0	261	0	24
Volume Right	0	96	0	0	169
cSH	1700	1700	1110	1700	425
Volume to Capacity	0.17	0.14	0.24	0.17	0.45
Queue Length 95th (ft)	0	0	23	0	58
Control Delay (s)	0.0	0.0	9.2	0.0	20.3
Lane LOS			A		C
Approach Delay (s)	0.0		4.4		20.3
Approach LOS					C

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		

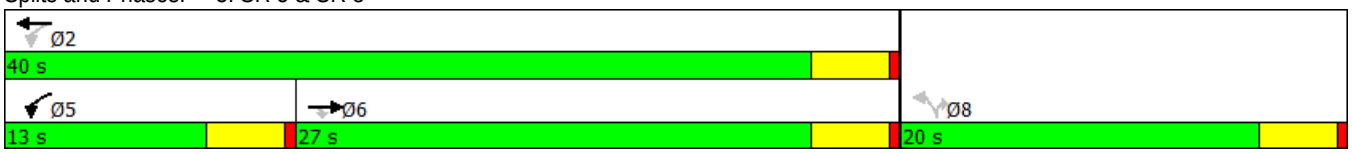
3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	463	112	254	400	56	141
Future Volume (vph)	463	112	254	400	56	141
Satd. Flow (prot)	1776	1429	1770	1759	1583	1524
Flt Permitted			0.202		0.950	
Satd. Flow (perm)	1776	1429	376	1759	1583	1524
Satd. Flow (RTOR)		124				183
Lane Group Flow (vph)	477	124	330	482	84	183
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	27.0	27.0	13.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	18.8	18.8	31.9	31.9	16.1	16.1
Actuated g/C Ratio	0.34	0.34	0.57	0.57	0.29	0.29
v/c Ratio	0.80	0.22	0.75	0.48	0.18	0.32
Control Delay	28.2	4.1	21.2	8.9	17.9	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	4.1	21.2	8.9	17.9	5.2
LOS	C	A	C	A	B	A
Approach Delay	23.2			13.9	9.2	
Approach LOS	C			B	A	
Queue Length 50th (ft)	140	0	51	83	22	0
Queue Length 95th (ft)	237	27	85	124	39	25
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	733	663	439	1137	455	568
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.19	0.75	0.42	0.18	0.32

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 56
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 16.5 — Intersection LOS: B
Intersection Capacity Utilization 51.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: SR 5 & SR 8



4: Gurley Road & SR 5

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	2	1	4	30	2	5	26	338	4	3	215	86
Future Volume (Veh/h)	2	1	4	30	2	5	26	338	4	3	215	86
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.33	0.83	0.25	0.63	0.59	0.80	0.33	0.25	0.84	0.86
Hourly flow rate (vph)	8	4	12	36	8	8	44	423	12	12	256	100
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	859	897	429	861	853	306	356			435		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	859	897	429	861	853	306	356			435		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	97	99	98	86	97	99	96			99		
cM capacity (veh/h)	260	268	630	253	285	739	1214			1135		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	24	52	479	368
Volume Left	8	36	44	12
Volume Right	12	8	12	100
cSH	371	287	1214	1135
Volume to Capacity	0.06	0.18	0.04	0.01
Queue Length 95th (ft)	5	16	3	1
Control Delay (s)	15.4	20.3	1.1	0.4
Lane LOS	C	C	A	A
Approach Delay (s)	15.4	20.3	1.1	0.4
Approach LOS	C	C		

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	46.5%	ICU Level of Service	A	
Analysis Period (min)	15			

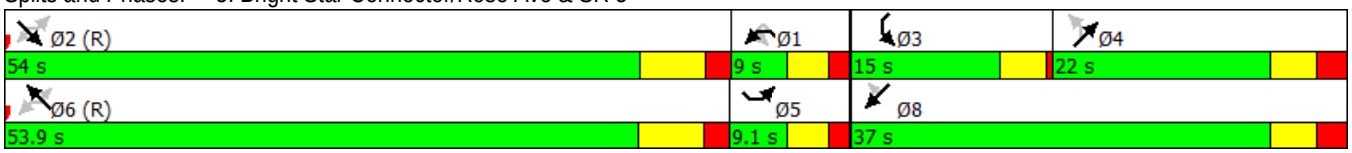
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	49	427	20	11	302	322	21	118	34	205	59	34
Future Volume (vph)	49	427	20	11	302	322	21	118	34	205	59	34
Satd. Flow (prot)	1641	1810	1615	1656	1810	1568	1641	3353	0	3400	1900	1524
Flt Permitted	0.526			0.408			0.700			0.950		
Satd. Flow (perm)	909	1810	1615	711	1810	1568	1209	3353	0	3400	1900	1524
Satd. Flow (RTOR)			127			332		37				93
Lane Group Flow (vph)	68	474	32	28	328	332	32	196	0	220	88	48
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	Perm
Protected Phases	5	2		1	6			4		3	8	
Permitted Phases	2		2	6		6	4					8
Total Split (s)	9.1	54.0	54.0	9.0	53.9	53.9	22.0	22.0		15.0	37.0	37.0
Total Lost Time (s)	4.8	6.7	6.7	4.8	6.7	6.7	5.8	5.8		4.0	5.8	5.8
Act Effct Green (s)	63.0	57.6	57.6	61.8	55.7	55.7	10.1	10.1		10.4	24.5	24.5
Actuated g/C Ratio	0.63	0.58	0.58	0.62	0.56	0.56	0.10	0.10		0.10	0.24	0.24
v/c Ratio	0.11	0.45	0.03	0.06	0.33	0.33	0.26	0.53		0.62	0.19	0.11
Control Delay	8.1	15.5	0.1	7.9	14.3	2.4	46.0	39.3		51.1	29.9	1.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	8.1	15.5	0.1	7.9	14.3	2.4	46.0	39.3		51.1	29.9	1.4
LOS	A	B	A	A	B	A	D	D		D	C	A
Approach Delay		13.8			8.3			40.2			39.2	
Approach LOS		B			A			D			D	
Queue Length 50th (ft)	15	181	0	6	113	0	19	51		70	44	0
Queue Length 95th (ft)	26	287	0	7	186	43	34	72		108	59	0
Internal Link Dist (ft)		179			236			1029			553	
Turn Bay Length (ft)	300		300	200			210			330		580
Base Capacity (vph)	603	1042	984	479	1008	1020	195	574		374	592	539
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.11	0.45	0.03	0.06	0.33	0.33	0.16	0.34		0.59	0.15	0.09

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 19.9 — Intersection LOS: B
Intersection Capacity Utilization 53.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



6: Bright Star Road & Brightstar Connector

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	96	8	192	172	13	220
Future Volume (Veh/h)	96	8	192	172	13	220
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.69	0.67	0.79	0.90	0.65	0.82
Hourly flow rate (vph)	139	12	243	191	20	268
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	551	243			243	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	551	243			243	
tC, single (s)	6.4	6.2			4.5	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.5	
p0 queue free %	72	99			98	
cM capacity (veh/h)	490	801			1139	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	139	12	243	191	20	268
Volume Left	139	0	0	0	20	0
Volume Right	0	12	0	191	0	0
cSH	490	801	1700	1700	1139	1700
Volume to Capacity	0.28	0.01	0.14	0.11	0.02	0.16
Queue Length 95th (ft)	29	1	0	0	1	0
Control Delay (s)	15.2	9.6	0.0	0.0	8.2	0.0
Lane LOS	C	A			A	
Approach Delay (s)	14.8		0.0		0.6	
Approach LOS	B					

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Conditions, PM Peak Hour

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	1	0	0	0	2	324	2	1	399	2
Future Volume (Veh/h)	0	0	1	0	0	0	2	324	2	1	399	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.92	0.92	0.50	0.86	0.25	0.25	0.86	0.50
Hourly flow rate (vph)	0	0	4	0	0	0	4	377	8	4	464	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	863	867	466	867	865	381	468			385		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	863	867	466	867	865	381	468			385		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	100	100	100	100			100		
cM capacity (veh/h)	276	291	601	270	290	666	1104			1185		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	0	389	472
Volume Left	0	0	4	4
Volume Right	4	0	8	4
cSH	601	1700	1104	1185
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (ft)	1	0	0	0
Control Delay (s)	11.0	0.0	0.1	0.1
Lane LOS	B	A	A	A
Approach Delay (s)	11.0	0.0	0.1	0.1
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	31.8%	ICU Level of Service	A	
Analysis Period (min)	15			

2: Bright Star Road & Veterans' Memorial Hwy

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	319	62	290	467	54	233
Future Volume (Veh/h)	319	62	290	467	54	233
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.67	0.90	0.81	0.84	0.94
Hourly flow rate (vph)	351	93	322	577	64	248
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked					0.76	
vC, conflicting volume			351		1618	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			351		1655	222
tC, single (s)			4.2		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		0	68
cM capacity (veh/h)			1197		51	779

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	234	210	322	577	312
Volume Left	0	0	322	0	64
Volume Right	0	93	0	0	248
cSH	1700	1700	1197	1700	197
Volume to Capacity	0.14	0.12	0.27	0.34	1.58
Queue Length 95th (ft)	0	0	27	0	504
Control Delay (s)	0.0	0.0	9.1	0.0	328.2
Lane LOS			A		F
Approach Delay (s)	0.0		3.3		328.2
Approach LOS					F

Intersection Summary			
Average Delay	63.7		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

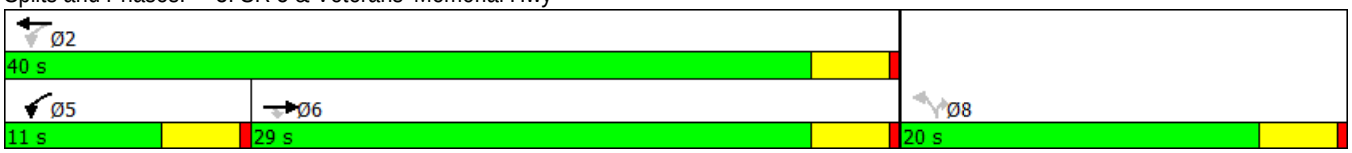
3: SR 5 & Veterans' Memorial Hwy

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	456	99	202	635	122	300
Future Volume (vph)	456	99	202	635	122	300
Satd. Flow (prot)	1863	1392	1805	1845	1736	1599
Flt Permitted			0.187		0.950	
Satd. Flow (perm)	1863	1392	355	1845	1736	1599
Satd. Flow (RTOR)		113				313
Lane Group Flow (vph)	512	113	243	730	197	313
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	29.0	29.0	11.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	19.1	19.1	30.1	30.1	16.1	16.1
Actuated g/C Ratio	0.35	0.35	0.55	0.55	0.30	0.30
v/c Ratio	0.78	0.20	0.63	0.71	0.38	0.45
Control Delay	24.9	3.8	15.0	13.4	19.3	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.9	3.8	15.0	13.4	19.3	5.0
LOS	C	A	B	B	B	A
Approach Delay	21.1			13.8	10.6	
Approach LOS	C			B	B	
Queue Length 50th (ft)	142	0	35	151	51	0
Queue Length 95th (ft)	233	23	61	237	71	51
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	863	705	385	1231	514	694
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.16	0.63	0.59	0.38	0.45

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 54.3
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 15.2 — Intersection LOS: B
Intersection Capacity Utilization 52.0% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: SR 5 & Veterans' Memorial Hwy



4: Gurley Road & SR 5

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	2	0	6	67	0	29	25	286	3	2	423	73
Future Volume (Veh/h)	2	0	6	67	0	29	25	286	3	2	423	73
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.75	0.84	0.92	0.81	0.63	0.79	0.38	0.50	0.87	0.83
Hourly flow rate (vph)	8	0	8	80	0	36	40	362	8	4	486	88
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1020	1028	366	992	988	530	574			370		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1020	1028	366	992	988	530	574			370		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	99	63	100	93	96			100		
cM capacity (veh/h)	196	226	684	217	238	547	1009			1200		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	16	116	410	578
Volume Left	8	80	40	4
Volume Right	8	36	8	88
cSH	305	267	1009	1200
Volume to Capacity	0.05	0.44	0.04	0.00
Queue Length 95th (ft)	4	52	3	0
Control Delay (s)	17.5	28.5	1.2	0.1
Lane LOS	C	D	A	A
Approach Delay (s)	17.5	28.5	1.2	0.1
Approach LOS	C	D		

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	52.7%	ICU Level of Service	A	
Analysis Period (min)	15			

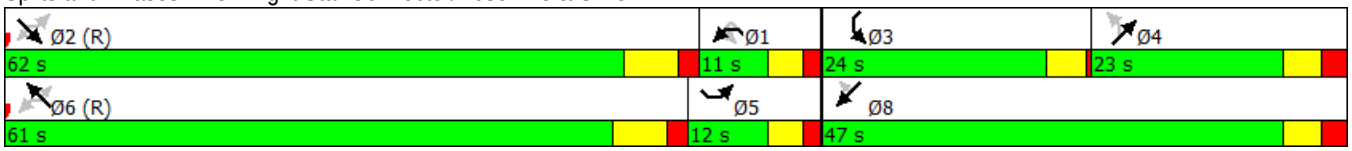
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	82	329	41	50	446	315	23	74	169	292	124	126
Future Volume (vph)	82	329	41	50	446	315	23	74	169	292	124	126
Satd. Flow (prot)	1770	1863	1468	1805	1863	1599	1805	3224	0	3502	1863	1615
Flt Permitted	0.398			0.483			0.644			0.950		
Satd. Flow (perm)	741	1863	1468	918	1863	1599	1224	3224	0	3502	1863	1615
Satd. Flow (RTOR)			105			346		219				143
Lane Group Flow (vph)	104	366	60	93	469	346	48	326	0	348	180	143
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	Perm
Protected Phases	5	2		1	6			4		3	8	
Permitted Phases	2		2	6		6	4					8
Total Split (s)	12.0	62.0	62.0	11.0	61.0	61.0	23.0	23.0		24.0	47.0	47.0
Total Lost Time (s)	4.8	6.7	6.7	4.8	6.7	6.7	5.8	5.8		4.0	5.8	5.8
Act Effct Green (s)	74.5	65.8	65.8	72.5	64.8	64.8	10.3	10.3		16.8	31.1	31.1
Actuated g/C Ratio	0.62	0.55	0.55	0.60	0.54	0.54	0.09	0.09		0.14	0.26	0.26
v/c Ratio	0.20	0.36	0.07	0.16	0.47	0.34	0.46	0.68		0.71	0.37	0.27
Control Delay	11.3	17.8	0.7	10.5	20.3	2.8	64.7	25.1		57.3	37.4	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	11.3	17.8	0.7	10.5	20.3	2.8	64.7	25.1		57.3	37.4	6.1
LOS	B	B	A	B	C	A	E	C		E	D	A
Approach Delay		14.6			12.6			30.2			41.0	
Approach LOS		B			B			C			D	
Queue Length 50th (ft)	27	153	0	24	215	0	36	42		134	115	0
Queue Length 95th (ft)	53	260	0	32	356	51	38	44		165	121	42
Internal Link Dist (ft)		179			236			1029			553	
Turn Bay Length (ft)	300		300	200			210			330		580
Base Capacity (vph)	524	1021	852	603	1006	1022	175	649		584	639	648
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.20	0.36	0.07	0.15	0.47	0.34	0.27	0.50		0.60	0.28	0.22

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 23.4 — Intersection LOS: C
Intersection Capacity Utilization 61.6% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



6: Bright Star Road & Brightstar Connector

Movement	WBU	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (veh/h)	46	174	62	264	173	62	344
Future Volume (Veh/h)	46	174	62	264	173	62	344
Sign Control		Stop		Free			Free
Grade		0%		0%			0%
Peak Hour Factor	0.92	0.92	0.70	0.92	0.72	0.67	0.95
Hourly flow rate (vph)	0	189	89	287	240	93	362
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None			None
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked	0.00						
vC, conflicting volume	0	835	287			287	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	0	835	287			287	
tC, single (s)	0.0	6.4	6.2			4.1	
tC, 2 stage (s)							
tF (s)	0.0	3.5	3.3			2.2	
p0 queue free %	0	40	88			93	
cM capacity (veh/h)	0	316	750			1275	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	189	89	287	240	93	362
Volume Left	189	0	0	0	93	0
Volume Right	0	89	0	240	0	0
cSH	316	750	1700	1700	1275	1700
Volume to Capacity	0.60	0.12	0.17	0.14	0.07	0.21
Queue Length 95th (ft)	91	10	0	0	6	0
Control Delay (s)	32.1	10.4	0.0	0.0	8.0	0.0
Lane LOS	D	B			A	
Approach Delay (s)	25.2		0.0		1.6	
Approach LOS	D					

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX E

CAPACITY ANALYSIS: 2020 NO-BUILD CONDITIONS
(w/ EXISTING GEOMETRY)

2020 No-Build Conditions, AM Peak Hour
(w/ Existing Geometry)

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	5	0	0	5	225	0	0	245	0
Future Volume (Veh/h)	0	0	10	5	0	0	5	225	0	0	245	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.50	0.25	0.92	0.92	0.25	0.80	0.92	0.92	0.88	0.92
Hourly flow rate (vph)	0	0	20	20	0	0	20	281	0	0	278	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	599	599	278	619	599	281	278			281		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	599	599	278	619	599	281	278			281		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	97	95	100	100	98			100		
cM capacity (veh/h)	409	409	766	389	411	763	1296			1282		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	20	301	278
Volume Left	0	20	20	0
Volume Right	20	0	0	0
cSH	766	389	1296	1282
Volume to Capacity	0.03	0.05	0.02	0.00
Queue Length 95th (ft)	2	4	1	0
Control Delay (s)	9.8	14.8	0.7	0.0
Lane LOS	A	B	A	
Approach Delay (s)	9.8	14.8	0.7	0.0
Approach LOS	A	B		

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	26.7%	ICU Level of Service	A	
Analysis Period (min)	15			

2: Bright Star Road & SR 8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	445	60	220	270	30	170
Future Volume (Veh/h)	445	60	220	270	30	170
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.60	0.79	0.90	0.75	0.94
Hourly flow rate (vph)	459	100	278	300	40	181
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked						
vC, conflicting volume			459		1365	280
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			459		1365	280
tC, single (s)			4.2		7.0	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			75		58	74
cM capacity (veh/h)			1091		95	709

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	306	253	278	300	221
Volume Left	0	0	278	0	40
Volume Right	0	100	0	0	181
cSH	1700	1700	1091	1700	327
Volume to Capacity	0.18	0.15	0.25	0.18	0.68
Queue Length 95th (ft)	0	0	25	0	116
Control Delay (s)	0.0	0.0	9.4	0.0	36.1
Lane LOS			A		E
Approach Delay (s)	0.0		4.5		36.1
Approach LOS					E

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	490	125	270	425	65	155
Future Volume (vph)	490	125	270	425	65	155
Satd. Flow (prot)	1776	1429	1770	1759	1583	1524
Flt Permitted			0.189		0.950	
Satd. Flow (perm)	1776	1429	352	1759	1583	1524
Satd. Flow (RTOR)		140				199
Lane Group Flow (vph)	500	140	342	500	100	199
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	27.0	27.0	13.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	19.4	19.4	32.5	32.5	16.1	16.1
Actuated g/C Ratio	0.34	0.34	0.57	0.57	0.28	0.28
v/c Ratio	0.82	0.24	0.80	0.50	0.22	0.35
Control Delay	29.5	3.9	25.6	9.0	18.5	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	3.9	25.6	9.0	18.5	5.2
LOS	C	A	C	A	B	A
Approach Delay	23.9			15.8	9.6	
Approach LOS	C			B	A	
Queue Length 50th (ft)	150	0	53	87	27	0
Queue Length 95th (ft)	#285	28	#126	135	43	27
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	724	665	428	1123	449	575
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.21	0.80	0.45	0.22	0.35

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 56.6
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 17.7 Intersection LOS: B
Intersection Capacity Utilization 54.3% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 5 & SR 8

4: Gurley Road & SR 5

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	5	5	10	40	5	20	35	360	10	5	230	100
Future Volume (Veh/h)	5	5	10	40	5	20	35	360	10	5	230	100
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.50	1.00	0.25	1.00	0.58	0.82	0.50	0.25	0.82	0.83
Hourly flow rate (vph)	20	20	20	40	20	20	60	439	20	20	280	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	979	1009	449	979	959	340	400			459		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	979	1009	449	979	959	340	400			459		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	90	91	97	79	92	97	95			98		
cM capacity (veh/h)	200	226	614	192	241	707	1170			1113		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	60	80	519	420
Volume Left	20	40	60	20
Volume Right	20	20	20	120
cSH	271	250	1170	1113
Volume to Capacity	0.22	0.32	0.05	0.02
Queue Length 95th (ft)	21	33	4	1
Control Delay (s)	22.0	26.0	1.5	0.6
Lane LOS	C	D	A	A
Approach Delay (s)	22.0	26.0	1.5	0.6
Approach LOS	C	D		

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	54.9%	ICU Level of Service	A	
Analysis Period (min)	15			

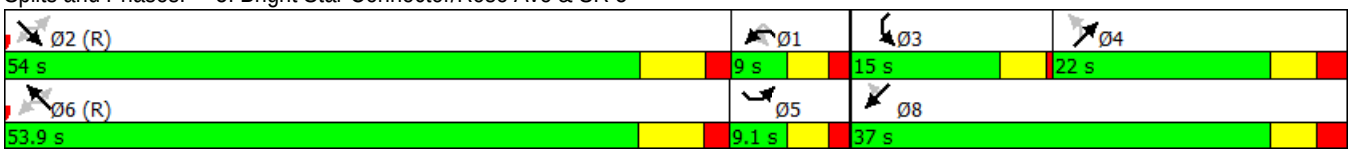
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	65	450	35	20	315	340	35	125	50	225	70	45
Future Volume (vph)	65	450	35	20	315	340	35	125	50	225	70	45
Satd. Flow (prot)	1641	1810	1615	1656	1810	1568	1641	3326	0	3400	1900	1524
Flt Permitted	0.515			0.384			0.692			0.950		
Satd. Flow (perm)	890	1810	1615	669	1810	1568	1195	3326	0	3400	1900	1524
Satd. Flow (RTOR)			127			362		46				93
Lane Group Flow (vph)	80	500	40	40	339	362	40	220	0	239	100	60
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	Perm
Protected Phases	5	2		1	6			4		3	8	
Permitted Phases	2		2	6		6	4					8
Total Split (s)	9.1	54.0	54.0	9.0	53.9	53.9	22.0	22.0		15.0	37.0	37.0
Total Lost Time (s)	4.8	6.7	6.7	4.8	6.7	6.7	5.8	5.8		4.0	5.8	5.8
Act Effct Green (s)	62.3	56.9	56.9	61.2	55.1	55.1	10.6	10.6		10.6	25.2	25.2
Actuated g/C Ratio	0.62	0.57	0.57	0.61	0.55	0.55	0.11	0.11		0.11	0.25	0.25
v/c Ratio	0.14	0.49	0.04	0.09	0.34	0.35	0.32	0.56		0.67	0.21	0.13
Control Delay	8.6	16.4	0.1	8.5	14.9	2.5	47.1	38.6		52.6	29.8	2.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	8.6	16.4	0.1	8.5	14.9	2.5	47.1	38.6		52.6	29.8	2.9
LOS	A	B	A	A	B	A	D	D		D	C	A
Approach Delay		14.4			8.5			39.9			39.4	
Approach LOS		B			A			D			D	
Queue Length 50th (ft)	18	197	0	9	119	0	24	55		76	50	0
Queue Length 95th (ft)	35	313	0	12	196	45	54	75		117	68	4
Internal Link Dist (ft)		179			236			1029			553	
Turn Bay Length (ft)	300		300	200			210			330		580
Base Capacity (vph)	586	1030	974	450	996	1025	193	577		374	592	539
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.14	0.49	0.04	0.09	0.34	0.35	0.21	0.38		0.64	0.17	0.11

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 20.5 — Intersection LOS: C
Intersection Capacity Utilization 56.2% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



6: Bright Star Road & Brightstar Connector

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	110	20	205	185	25	235
Future Volume (Veh/h)	110	20	205	185	25	235
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.69	1.00	0.79	0.93	0.63	0.84
Hourly flow rate (vph)	159	20	259	199	40	280
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	619	259			259	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	619	259			259	
tC, single (s)	6.4	6.2			4.5	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.5	
p0 queue free %	64	97			96	
cM capacity (veh/h)	439	785			1123	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	159	20	259	199	40	280
Volume Left	159	0	0	0	40	0
Volume Right	0	20	0	199	0	0
cSH	439	785	1700	1700	1123	1700
Volume to Capacity	0.36	0.03	0.15	0.12	0.04	0.16
Queue Length 95th (ft)	41	2	0	0	3	0
Control Delay (s)	17.8	9.7	0.0	0.0	8.3	0.0
Lane LOS	C	A			A	
Approach Delay (s)	16.9		0.0		1.0	
Approach LOS	C					

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		

2020 No-Build Conditions, PM Peak Hour
(w/ Existing Geometry)

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	0	0	0	10	345	5	5	420	10
Future Volume (Veh/h)	0	0	5	0	0	0	10	345	5	5	420	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.25	0.25	0.92	0.92	0.50	0.86	0.25	0.25	0.88	0.50
Hourly flow rate (vph)	0	0	20	0	0	0	20	401	20	20	477	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	978	988	487	998	988	411	497			421		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	978	988	487	998	988	411	497			421		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	97	100	100	100	98			98		
cM capacity (veh/h)	223	238	585	211	240	645	1077			1149		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	0	441	517
Volume Left	0	0	20	20
Volume Right	20	0	20	20
cSH	585	1700	1077	1149
Volume to Capacity	0.03	0.00	0.02	0.02
Queue Length 95th (ft)	3	0	1	1
Control Delay (s)	11.4	0.0	0.6	0.5
Lane LOS	B	A	A	A
Approach Delay (s)	11.4	0.0	0.6	0.5
Approach LOS	B	A		

Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	34.9%	ICU Level of Service	A	
Analysis Period (min)	15			

2: Bright Star Road & SR 8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	335	75	310	490	70	250
Future Volume (Veh/h)	335	75	310	490	70	250
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.75	0.91	0.82	0.88	0.96
Hourly flow rate (vph)	381	100	341	598	80	260
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked					0.75	
vC, conflicting volume			381		1711	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			381		1782	240
tC, single (s)			4.2		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		0	66
cM capacity (veh/h)			1167		40	757

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	254	227	341	598	340
Volume Left	0	0	341	0	80
Volume Right	0	100	0	0	260
cSH	1700	1700	1167	1700	144
Volume to Capacity	0.15	0.13	0.29	0.35	2.36
Queue Length 95th (ft)	0	0	31	0	723
Control Delay (s)	0.0	0.0	9.4	0.0	683.8
Lane LOS			A		F
Approach Delay (s)	0.0		3.4		683.8
Approach LOS					F

Intersection Summary			
Average Delay	133.9		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	475	110	215	665	140	325
Future Volume (vph)	475	110	215	665	140	325
Satd. Flow (prot)	1863	1392	1805	1845	1736	1599
Flt Permitted			0.168		0.950	
Satd. Flow (perm)	1863	1392	319	1845	1736	1599
Satd. Flow (RTOR)		120				339
Lane Group Flow (vph)	540	120	259	756	219	339
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	27.0	27.0	13.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	19.8	19.8	32.5	32.5	16.1	16.1
Actuated g/C Ratio	0.35	0.35	0.57	0.57	0.28	0.28
v/c Ratio	0.83	0.21	0.63	0.71	0.44	0.49
Control Delay	29.6	4.1	14.9	13.2	21.3	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	4.1	14.9	13.2	21.3	5.3
LOS	C	A	B	B	C	A
Approach Delay	25.0			13.6	11.6	
Approach LOS	C			B	B	
Queue Length 50th (ft)	164	0	38	160	65	0
Queue Length 95th (ft)	#276	27	77	258	81	53
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	761	639	420	1179	493	697
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.19	0.62	0.64	0.44	0.49

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 56.7
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 16.5 Intersection LOS: B
Intersection Capacity Utilization 54.7% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 5 & SR 8

4: Gurley Road & SR 5

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	5	0	20	80	0	35	40	305	10	10	445	85
Future Volume (Veh/h)	5	0	20	80	0	35	40	305	10	10	445	85
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	1.00	0.80	0.25	0.88	0.67	0.80	0.50	0.50	0.89	0.85
Hourly flow rate (vph)	20	0	20	100	0	40	60	381	20	20	500	100
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1141	1151	391	1121	1111	550	600			401		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1141	1151	391	1121	1111	550	600			401		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	100	97	41	100	92	94			98		
cM capacity (veh/h)	156	184	662	169	195	533	987			1169		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	40	140	461	620
Volume Left	20	100	60	20
Volume Right	20	40	20	100
cSH	253	210	987	1169
Volume to Capacity	0.16	0.67	0.06	0.02
Queue Length 95th (ft)	14	102	5	1
Control Delay (s)	21.9	50.9	1.8	0.5
Lane LOS	C	F	A	A
Approach Delay (s)	21.9	50.9	1.8	0.5
Approach LOS	C	F		

Intersection Summary				
Average Delay	7.2			
Intersection Capacity Utilization	59.1%	ICU Level of Service	B	
Analysis Period (min)	15			

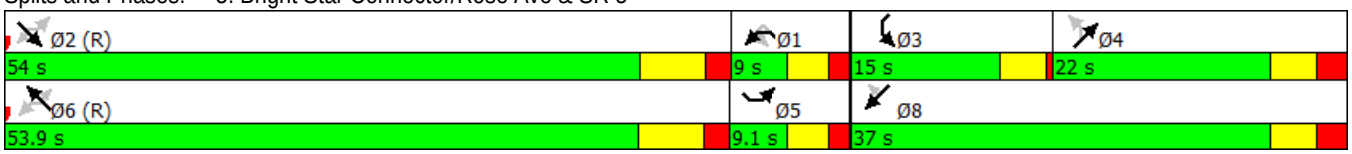
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	95	345	55	55	475	335	35	85	185	310	135	145
Future Volume (vph)	95	345	55	55	475	335	35	85	185	310	135	145
Satd. Flow (prot)	1770	1863	1468	1805	1863	1599	1805	3227	0	3502	1863	1615
Flt Permitted	0.375			0.479			0.633			0.950		
Satd. Flow (perm)	699	1863	1468	910	1863	1599	1203	3227	0	3502	1863	1615
Satd. Flow (RTOR)			127			360		240				159
Lane Group Flow (vph)	120	379	80	100	500	360	60	360	0	360	199	159
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Prot	NA	Perm
Protected Phases	5	2		1	6			4		3	8	
Permitted Phases	2		2	6		6	4					8
Total Split (s)	9.1	54.0	54.0	9.0	53.9	53.9	22.0	22.0		15.0	37.0	37.0
Total Lost Time (s)	4.8	6.7	6.7	4.8	6.7	6.7	5.8	5.8		4.0	5.8	5.8
Act Effct Green (s)	60.1	54.8	54.8	59.0	52.9	52.9	10.5	10.5		11.0	25.5	25.5
Actuated g/C Ratio	0.60	0.55	0.55	0.59	0.53	0.53	0.10	0.10		0.11	0.26	0.26
v/c Ratio	0.26	0.37	0.09	0.17	0.51	0.35	0.48	0.65		0.94	0.42	0.30
Control Delay	10.8	15.6	1.0	9.3	18.3	2.7	53.3	19.9		77.4	33.2	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	10.8	15.6	1.0	9.3	18.3	2.7	53.3	19.9		77.4	33.2	5.9
LOS	B	B	A	A	B	A	D	B		E	C	A
Approach Delay		12.6			11.5			24.7			49.3	
Approach LOS		B			B			C			D	
Queue Length 50th (ft)	27	135	0	22	194	0	37	37		119	106	0
Queue Length 95th (ft)	50	229	0	29	323	47	46	44		#190	115	45
Internal Link Dist (ft)		179			236			1029			553	
Turn Bay Length (ft)	300		300	200			210			330		580
Base Capacity (vph)	466	1020	861	574	985	1015	194	723		385	581	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.26	0.37	0.09	0.17	0.51	0.35	0.31	0.50		0.94	0.34	0.26

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 23.9 — Intersection LOS: C
Intersection Capacity Utilization 65.2% — ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



6: Bright Star Road & Brightstar Connector

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	240	75	280	190	75	365
Future Volume (Veh/h)	240	75	280	190	75	365
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.75	0.93	0.73	0.75	0.96
Hourly flow rate (vph)	261	100	301	260	100	380
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	881	301			301	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	881	301			301	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	11	86			92	
cM capacity (veh/h)	294	736			1260	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	261	100	301	260	100	380
Volume Left	261	0	0	0	100	0
Volume Right	0	100	0	260	0	0
cSH	294	736	1700	1700	1260	1700
Volume to Capacity	0.89	0.14	0.18	0.15	0.08	0.22
Queue Length 95th (ft)	201	12	0	0	6	0
Control Delay (s)	66.1	10.7	0.0	0.0	8.1	0.0
Lane LOS	F	B			A	
Approach Delay (s)	50.7		0.0		1.7	
Approach LOS	F					

Intersection Summary			
Average Delay	13.6		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX F

CAPACITY ANALYSIS: 2020 NO-BUILD CONDITIONS
(w/ RECOMMENDED IMPROVEMENTS)

2020 No-Build Conditions, AM Peak Hour
(w/ Recommended Improvements)

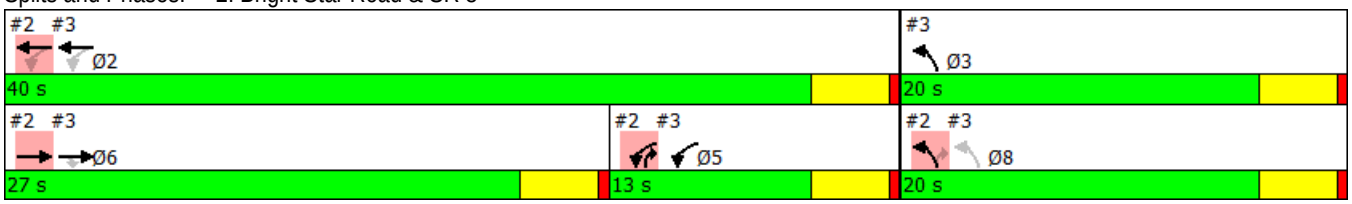
2: Bright Star Road & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations							
Traffic Volume (vph)	445	60	220	270	30	170	
Future Volume (vph)	445	60	220	270	30	170	
Satd. Flow (prot)	3263	0	1752	1681	1626	1538	
Flt Permitted			0.425		0.950		
Satd. Flow (perm)	3263	0	784	1681	1626	1538	
Satd. Flow (RTOR)	50					181	
Lane Group Flow (vph)	559	0	278	300	40	181	
Turn Type	NA		pm+pt	NA	Prot	pm+ov	
Protected Phases	6		5	2	8	5	3
Permitted Phases			2			8	
Total Split (s)	27.0		13.0	40.0	20.0	13.0	20.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0	
Act Effct Green (s)	23.6		36.5	38.5	8.0	16.2	
Actuated g/C Ratio	0.49		0.76	0.80	0.17	0.34	
v/c Ratio	0.34		0.36	0.22	0.15	0.28	
Control Delay	9.1		4.6	2.4	19.7	3.3	
Queue Delay	0.0		0.0	0.0	0.0	0.0	
Total Delay	9.1		4.6	2.4	19.7	3.3	
LOS	A		A	A	B	A	
Approach Delay	9.1			3.5	6.2		
Approach LOS	A			A	A		
Queue Length 50th (ft)	50		20	23	11	0	
Queue Length 95th (ft)	93		35	43	26	27	
Internal Link Dist (ft)	785			258	2740		
Turn Bay Length (ft)			90			300	
Base Capacity (vph)	1628		789	1326	555	650	
Starvation Cap Reductn	0		0	0	0	0	
Spillback Cap Reductn	45		0	0	0	2	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.35		0.35	0.23	0.07	0.28	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 48
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 6.2 — Intersection LOS: A
Intersection Capacity Utilization 39.7% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Bright Star Road & SR 8



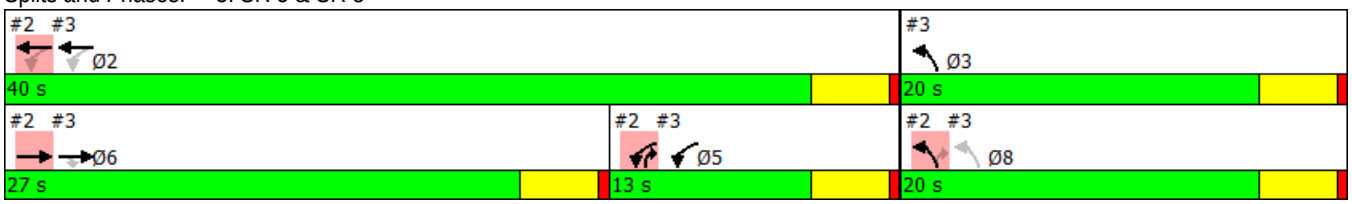
3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	490	125	270	425	65	155	
Future Volume (vph)	490	125	270	425	65	155	
Satd. Flow (prot)	1776	1429	1770	1759	1583	1524	
Flt Permitted			0.375		0.950		
Satd. Flow (perm)	1776	1429	699	1759	1583	1524	
Satd. Flow (RTOR)		140				199	
Lane Group Flow (vph)	500	140	342	500	100	199	
Turn Type	NA	Perm	pm+pt	NA	pm+pt	Free	
Protected Phases	6		5	2	3		8
Permitted Phases		6	2		8	Free	
Total Split (s)	27.0	27.0	13.0	40.0	20.0		20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		
Act Effct Green (s)	23.6	23.6	36.5	38.5	7.9	48.0	
Actuated g/C Ratio	0.49	0.49	0.76	0.80	0.16	1.00	
v/c Ratio	0.57	0.18	0.47	0.35	0.38	0.13	
Control Delay	8.9	0.8	8.7	4.3	23.7	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	8.9	0.8	8.7	4.3	23.7	0.2	
LOS	A	A	A	A	C	A	
Approach Delay	7.1			6.1	8.0		
Approach LOS	A			A	A		
Queue Length 50th (ft)	43	0	29	47	28	0	
Queue Length 95th (ft)	85	0	60	105	44	0	
Internal Link Dist (ft)	258			785	2136		
Turn Bay Length (ft)			200			150	
Base Capacity (vph)	872	773	743	1388	540	1524	
Starvation Cap Reductn	4	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.58	0.18	0.46	0.36	0.19	0.13	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 48
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 6.8 — Intersection LOS: A
Intersection Capacity Utilization 54.3% — ICU Level of Service A
Analysis Period (min) 15

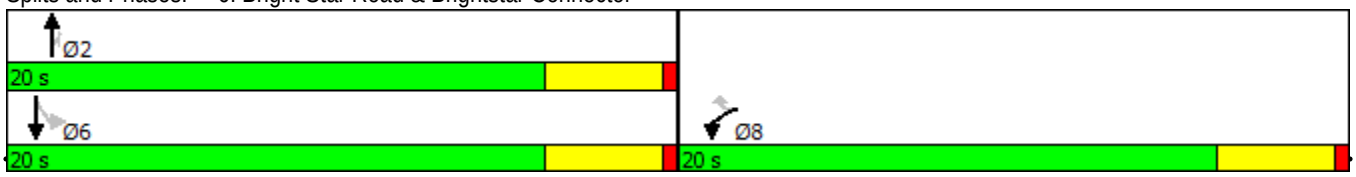
Splits and Phases: 3: SR 5 & SR 8



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	110	20	205	185	25	235
Future Volume (vph)	110	20	205	185	25	235
Satd. Flow (prot)	1805	1615	1810	1583	1308	1776
Flt Permitted	0.950				0.599	
Satd. Flow (perm)	1805	1615	1810	1583	825	1776
Satd. Flow (RTOR)		20		199		
Peak Hour Factor	0.69	1.00	0.79	0.93	0.63	0.84
Heavy Vehicles (%)	0%	0%	5%	2%	38%	7%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	159	20	259	199	40	280
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	7.9	7.9	19.0	19.0	19.0	19.0
Actuated g/C Ratio	0.28	0.28	0.66	0.66	0.66	0.66
v/c Ratio	0.32	0.04	0.22	0.18	0.07	0.24
Control Delay	10.2	4.5	5.5	1.8	5.7	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.2	4.5	5.5	1.8	5.7	5.6
LOS	B	A	A	A	A	A
Approach Delay	9.6		3.9			5.6
Approach LOS	A		A			A
Queue Length 50th (ft)	20	0	21	0	3	23
Queue Length 95th (ft)	33	7	47	18	9	55
Internal Link Dist (ft)	3107		959			1503
Turn Bay Length (ft)				150	150	
Base Capacity (vph)	1022	924	1288	1184	587	1264
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.02	0.20	0.17	0.07	0.22

Intersection Summary	
Cycle Length: 40	
Actuated Cycle Length: 28.6	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.32	
Intersection Signal Delay: 5.5	Intersection LOS: A
Intersection Capacity Utilization 30.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Bright Star Road & Brightstar Connector



2020 No-Build Conditions, PM Peak Hour (w/ Recommended Improvements)

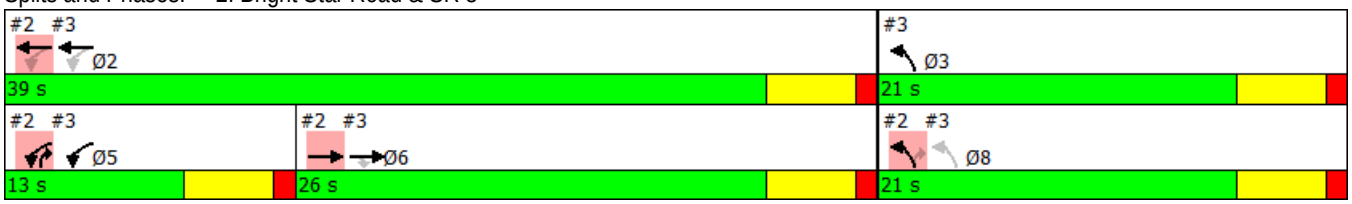
2: Bright Star Road & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations							
Traffic Volume (vph)	335	75	310	490	70	250	
Future Volume (vph)	335	75	310	490	70	250	
Satd. Flow (prot)	3377	0	1752	1845	1805	1568	
Flt Permitted			0.374		0.950		
Satd. Flow (perm)	3377	0	690	1845	1805	1568	
Satd. Flow (RTOR)	60						
Lane Group Flow (vph)	481	0	341	598	80	260	
Turn Type	NA		pm+pt	NA	Prot	pm+ov	
Protected Phases	6		5	2	8	5	3
Permitted Phases			2			8	
Total Split (s)	26.0		13.0	39.0	21.0	13.0	21.0
Total Lost Time (s)	5.0		5.0	5.0	5.0	5.0	
Act Effct Green (s)	21.1		34.1	34.1	11.7	24.7	
Actuated g/C Ratio	0.38		0.61	0.61	0.21	0.44	
v/c Ratio	0.37		0.59	0.53	0.21	0.37	
Control Delay	12.4		8.2	6.0	19.2	12.0	
Queue Delay	0.0		0.0	0.4	0.0	0.0	
Total Delay	12.5		8.2	6.5	19.2	12.0	
LOS	B		A	A	B	B	
Approach Delay	12.5			7.1	13.7		
Approach LOS	B			A	B		
Queue Length 50th (ft)	50		38	68	22	54	
Queue Length 95th (ft)	90		m73	103	50	99	
Internal Link Dist (ft)	785			258	2740		
Turn Bay Length (ft)			200			300	
Base Capacity (vph)	1312		574	1127	518	694	
Starvation Cap Reductn	0		0	177	0	0	
Spillback Cap Reductn	76		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.39		0.59	0.63	0.15	0.37	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 55.8
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 9.9 — Intersection LOS: A
Intersection Capacity Utilization 45.2% — ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Bright Star Road & SR 8



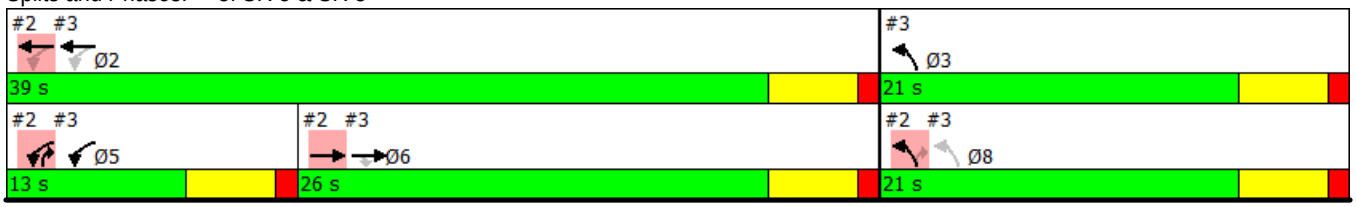
3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	475	110	215	665	140	325	
Future Volume (vph)	475	110	215	665	140	325	
Satd. Flow (prot)	1863	1392	1805	1845	1736	1599	
Flt Permitted			0.199		0.950		
Satd. Flow (perm)	1863	1392	378	1845	1736	1599	
Satd. Flow (RTOR)		120				339	
Lane Group Flow (vph)	540	120	259	756	219	339	
Turn Type	NA	Perm	pm+pt	NA	pm+pt	Free	
Protected Phases	6		5	2	3		8
Permitted Phases		6	2		8	Free	
Total Split (s)	26.0	26.0	13.0	39.0	21.0		21.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		
Act Effct Green (s)	21.1	21.1	34.1	34.1	11.7	55.8	
Actuated g/C Ratio	0.38	0.38	0.61	0.61	0.21	1.00	
v/c Ratio	0.77	0.20	0.59	0.67	0.60	0.21	
Control Delay	23.0	3.9	12.6	11.7	27.3	0.3	
Queue Delay	0.1	0.0	0.0	0.0	0.0	0.0	
Total Delay	23.2	3.9	12.6	11.7	27.3	0.3	
LOS	C	A	B	B	C	A	
Approach Delay	19.7			11.9	10.9		
Approach LOS	B			B	B		
Queue Length 50th (ft)	106	0	33	141	66	0	
Queue Length 95th (ft)	#330	11	70	287	81	0	
Internal Link Dist (ft)	258			785	2136		
Turn Bay Length (ft)			200			150	
Base Capacity (vph)	703	600	436	1127	499	1599	
Starvation Cap Reductn	6	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.77	0.20	0.59	0.67	0.44	0.21	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 55.8
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 14.0 Intersection LOS: B
Intersection Capacity Utilization 57.2% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

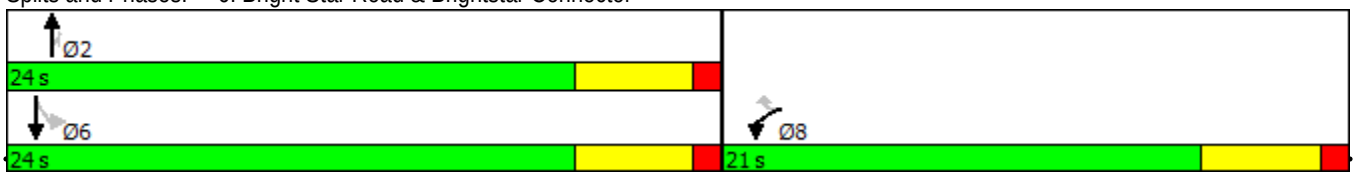
Splits and Phases: 3: SR 5 & SR 8



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	240	75	280	190	75	365
Future Volume (vph)	240	75	280	190	75	365
Satd. Flow (prot)	1805	1568	1881	1599	1770	1881
Flt Permitted	0.950				0.577	
Satd. Flow (perm)	1805	1568	1881	1599	1075	1881
Satd. Flow (RTOR)		100		260		
Peak Hour Factor	0.92	0.75	0.93	0.73	0.75	0.96
Heavy Vehicles (%)	0%	3%	1%	1%	2%	1%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	100	301	260	100	380
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Total Split (s)	21.0	21.0	24.0	24.0	24.0	24.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Act Effct Green (s)	10.2	10.2	17.1	17.1	17.1	17.1
Actuated g/C Ratio	0.30	0.30	0.51	0.51	0.51	0.51
v/c Ratio	0.47	0.18	0.31	0.28	0.18	0.40
Control Delay	13.2	3.8	8.8	2.4	8.7	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	3.8	8.8	2.4	8.7	9.5
LOS	B	A	A	A	A	A
Approach Delay	10.6		5.8			9.4
Approach LOS	B		A			A
Queue Length 50th (ft)	33	0	34	0	11	45
Queue Length 95th (ft)	96	14	94	15	31	121
Internal Link Dist (ft)	3107		959			1503
Turn Bay Length (ft)				150	150	
Base Capacity (vph)	894	827	1210	1121	691	1210
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.12	0.25	0.23	0.14	0.31

Intersection Summary	
Cycle Length: 45	
Actuated Cycle Length: 33.5	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 8.3	Intersection LOS: A
Intersection Capacity Utilization 44.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Bright Star Road & Brightstar Connector



2020 No-Build Conditions: Roundabout Analysis - AM Peak Hour

LANE SUMMARY

Site: 101 [BRIGHT STAR @ CONN.]

New Site
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: BRIGHT STAR RD													
Lane 1[d]	474	1.9	1339	0.354	100	5.9	LOS A	2.7	67.5	Full	1600	0.0	0.0
Approach	474	1.9		0.354		5.9	LOS A	2.7	67.5				
East: BRIGHT STAR CONNECTOR													
Lane 1[d]	120	0.0	1433	0.083	100	3.2	LOS A	0.5	11.6	Full	1600	0.0	0.0
Lane 2	27	8.0	872	0.031	100	4.4	LOS A	0.2	4.0	Full	1600	0.0	0.0
Approach	146	1.5		0.083		3.4	LOS A	0.5	11.6				
North: BRIGHT STAR RD													
Lane 1[d]	278	3.7	1208	0.230	100	5.0	LOS A	1.5	37.5	Full	1600	0.0	0.0
Approach	278	3.7		0.230		5.0	LOS A	1.5	37.5				
Intersection	898	2.4		0.354		5.2	LOS A	2.7	67.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: WILBURN ENGINEERING | Processed: Wednesday, December 28, 2016 2:41:47 PM
Project: P:\16-125 The Silverman Group, Bright Star Road DRI\Roundabout Analysis\2020 No-Build - Bright Star and Connector - AM.sip7

2020 No-Build Conditions: Roundabout Analysis - PM Peak Hour

LANE SUMMARY

Site: 101 [BRIGHT STAR @ CONN.]

New Site
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: BRIGHT STAR RD													
Lane 1[d]	561	2.1	1233	0.455	100	7.6	LOS A	3.9	99.8	Full	1600	0.0	0.0
Approach	561	2.1		0.455		7.6	LOS A	3.9	99.8				
East: BRIGHT STAR CONNECTOR													
Lane 1[d]	261	0.0	1333	0.196	100	4.3	LOS A	1.3	31.8	Full	1600	0.0	0.0
Lane 2	100	8.0	892	0.112	100	5.1	LOS A	0.6	16.7	Full	1600	0.0	0.0
Approach	361	2.2		0.196		4.5	LOS A	1.3	31.8				
North: BRIGHT STAR RD													
Lane 1[d]	480	4.2	1047	0.459	100	8.6	LOS A	3.5	91.5	Full	1600	0.0	0.0
Approach	480	4.2		0.459		8.6	LOS A	3.5	91.5				
Intersection	1402	2.9		0.459		7.2	LOS A	3.9	99.8				

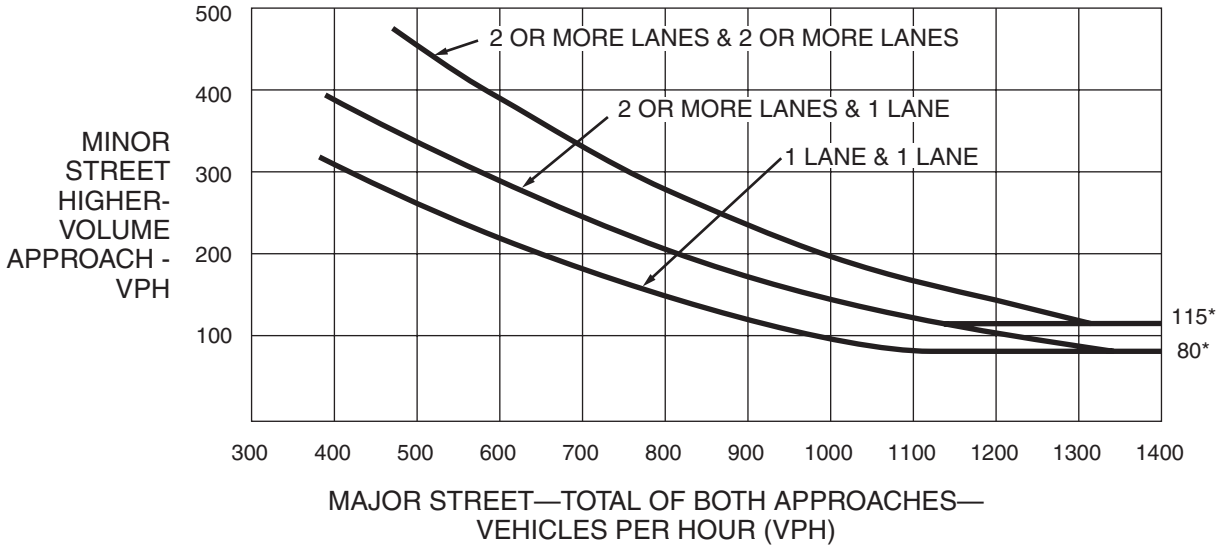
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: WILBURN ENGINEERING | Processed: Wednesday, December 28, 2016 2:45:30 PM
Project: P:\16-125 The Silverman Group, Bright Star Road DRI\Roundabout Analysis\2020 No-Build - Bright Star and Connector - PM.sip7

APPENDIX G
WARRANT THRESHOLDS

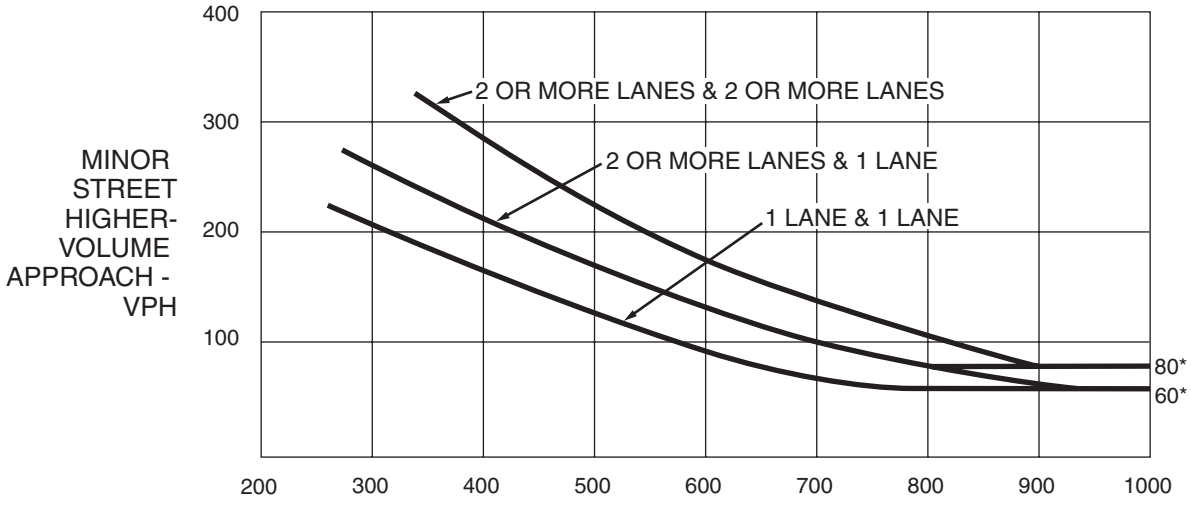
Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

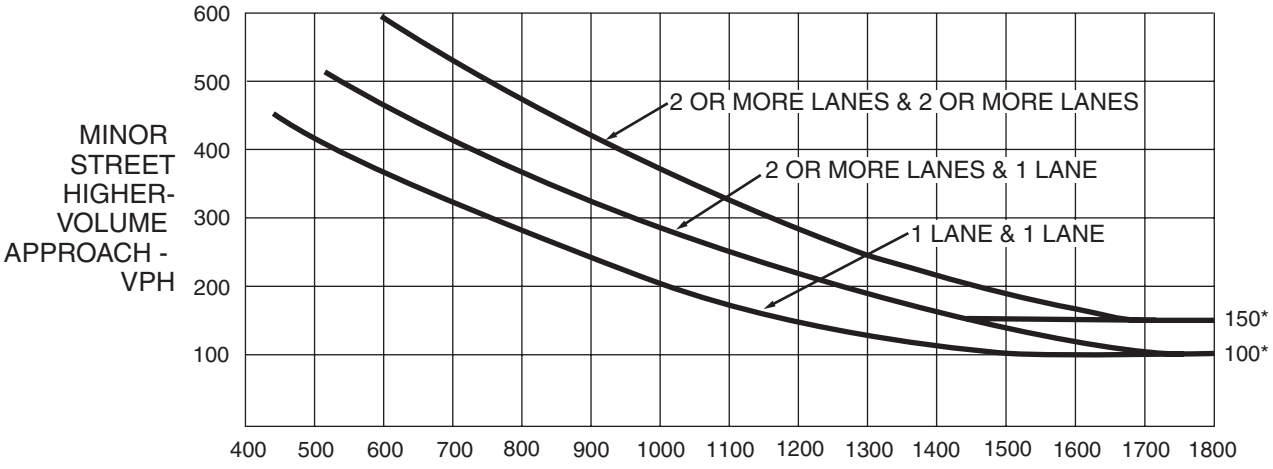
Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

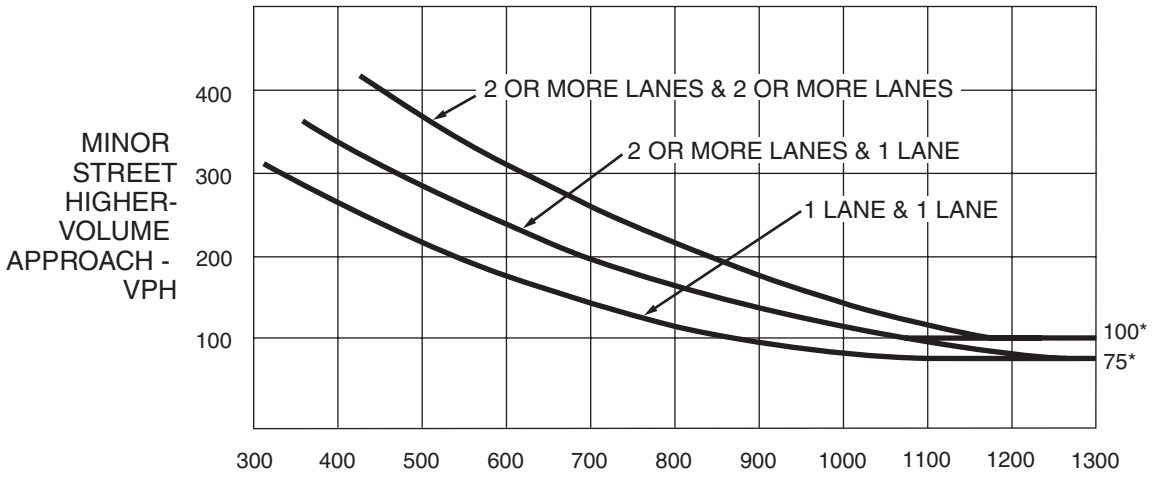
Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

APPENDIX H

CAPACITY ANALYSIS: 2020 BUILD CONDITIONS
(w/ EXISTING GEOMETRY)

2020 Build Conditions: AM Peak Hour
(w/ Existing Geometry)

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	10	35	0	33	5	225	114	122	245	0
Future Volume (Veh/h)	0	0	10	35	0	33	5	225	114	122	245	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.50	0.25	0.92	0.92	0.25	0.80	0.92	0.92	0.88	0.92
Hourly flow rate (vph)	0	0	20	140	0	36	20	281	124	133	278	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	963	989	278	947	927	343	278			405		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	963	989	278	947	927	343	278			405		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.4	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.4		
p0 queue free %	100	100	97	30	100	94	98			87		
cM capacity (veh/h)	198	212	766	199	232	652	1296			1049		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	176	425	411
Volume Left	0	140	20	133
Volume Right	20	36	124	0
cSH	766	232	1296	1049
Volume to Capacity	0.03	0.76	0.02	0.13
Queue Length 95th (ft)	2	133	1	11
Control Delay (s)	9.8	56.8	0.5	3.8
Lane LOS	A	F	A	A
Approach Delay (s)	9.8	56.8	0.5	3.8
Approach LOS	A	F		

Intersection Summary				
Average Delay	11.6			
Intersection Capacity Utilization	59.3%	ICU Level of Service	B	
Analysis Period (min)	15			

2: Bright Star Road & SR 8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	445	110	292	270	43	190
Future Volume (Veh/h)	445	110	292	270	43	190
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.60	0.79	0.90	0.75	0.94
Hourly flow rate (vph)	459	183	370	300	57	202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked						
vC, conflicting volume			459		1590	321
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			459		1590	321
tC, single (s)			4.3		7.2	7.1
tC, 2 stage (s)						
tF (s)			2.3		3.7	3.4
p0 queue free %			65		0	69
cM capacity (veh/h)			1050		54	657

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	306	336	370	300	259
Volume Left	0	0	370	0	57
Volume Right	0	183	0	0	202
cSH	1700	1700	1050	1700	189
Volume to Capacity	0.18	0.20	0.35	0.18	1.37
Queue Length 95th (ft)	0	0	40	0	378
Control Delay (s)	0.0	0.0	10.3	0.0	243.4
Lane LOS			B		F
Approach Delay (s)	0.0		5.7		243.4
Approach LOS					F

Intersection Summary			
Average Delay	42.5		
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	495	140	270	444	118	155
Future Volume (vph)	495	140	270	444	118	155
Satd. Flow (prot)	1776	1417	1770	1759	1480	1524
Flt Permitted			0.186		0.950	
Satd. Flow (perm)	1776	1417	346	1759	1480	1524
Satd. Flow (RTOR)		157				199
Lane Group Flow (vph)	505	157	342	522	182	199
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	27.0	27.0	13.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	19.6	19.6	32.7	32.7	16.1	16.1
Actuated g/C Ratio	0.35	0.35	0.58	0.58	0.28	0.28
v/c Ratio	0.82	0.27	0.80	0.52	0.44	0.35
Control Delay	29.8	3.9	26.2	9.3	21.7	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	3.9	26.2	9.3	21.7	5.2
LOS	C	A	C	A	C	A
Approach Delay	23.6			16.0	13.1	
Approach LOS	C			B	B	
Queue Length 50th (ft)	152	0	53	93	53	0
Queue Length 95th (ft)	#289	30	#128	142	72	27
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	722	669	425	1119	418	574
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.23	0.80	0.47	0.44	0.35

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 56.8
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 57.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 5 & SR 8

4: Gurley Road & SR 5

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	5	5	10	40	5	20	35	375	10	5	283	100
Future Volume (Veh/h)	5	5	10	40	5	20	35	375	10	5	283	100
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.50	1.00	0.25	1.00	0.58	0.82	0.50	0.25	0.82	0.83
Hourly flow rate (vph)	20	20	20	40	20	20	60	457	20	20	345	120
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1062	1092	467	1062	1042	405	465			477		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1062	1092	467	1062	1042	405	465			477		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	88	90	97	76	91	97	95			98		
cM capacity (veh/h)	173	201	600	166	215	650	1107			1096		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	60	80	537	485
Volume Left	20	40	60	20
Volume Right	20	20	20	120
cSH	241	220	1107	1096
Volume to Capacity	0.25	0.36	0.05	0.02
Queue Length 95th (ft)	24	39	4	1
Control Delay (s)	24.8	30.5	1.5	0.5
Lane LOS	C	D	A	A
Approach Delay (s)	24.8	30.5	1.5	0.5
Approach LOS	C	D		

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	56.5%	ICU Level of Service	B	
Analysis Period (min)	15			

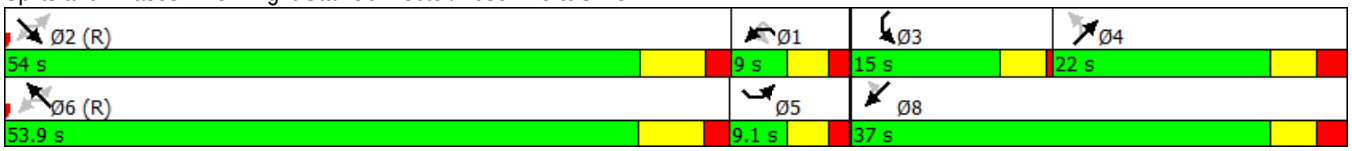
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWU	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	65	465	35	5	74	368	340	35	125	64	225	70
Future Volume (vph)	65	465	35	5	74	368	340	35	125	64	225	70
Satd. Flow (prot)	1641	1792	1615	0	1562	1727	1568	1641	3234	0	3400	1900
Flt Permitted	0.465				0.363			0.692			0.950	
Satd. Flow (perm)	803	1792	1615	0	597	1727	1568	1195	3234	0	3400	1900
Satd. Flow (RTOR)			127				362		69			
Lane Group Flow (vph)	80	517	40	0	153	396	362	40	237	0	239	100
Turn Type	pm+pt	NA	Perm	custom	pm+pt	NA	Perm	Perm	NA		Prot	NA
Protected Phases	5	2			1	6			4		3	8
Permitted Phases	2		2	1	6		6	4				
Total Split (s)	9.1	54.0	54.0	9.0	9.0	53.9	53.9	22.0	22.0		15.0	37.0
Total Lost Time (s)	4.8	6.7	6.7		4.8	6.7	6.7	5.8	5.8		4.0	5.8
Act Effct Green (s)	59.5	53.3	53.3		60.3	55.1	55.1	10.6	10.6		10.6	25.2
Actuated g/C Ratio	0.60	0.53	0.53		0.60	0.55	0.55	0.11	0.11		0.11	0.25
v/c Ratio	0.16	0.54	0.04		0.38	0.42	0.35	0.32	0.59		0.67	0.21
Control Delay	9.0	18.7	0.1		13.1	16.1	2.5	47.0	35.6		52.6	29.7
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	9.0	18.7	0.1		13.1	16.1	2.5	47.0	35.6		52.6	29.7
LOS	A	B	A		B	B	A	D	D		D	C
Approach Delay		16.3				10.2			37.3			39.4
Approach LOS		B				B			D			D
Queue Length 50th (ft)	18	207	0		36	147	0	24	54		76	50
Queue Length 95th (ft)	35	330	0		36	240	45	54	73		117	67
Internal Link Dist (ft)		179				236			1029			553
Turn Bay Length (ft)	300		300		200			210			330	
Base Capacity (vph)	514	955	920		400	950	1026	193	581		374	592
Starvation Cap Reductn	0	0	0		0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0	0	0	0		0	0
Reduced v/c Ratio	0.16	0.54	0.04		0.38	0.42	0.35	0.21	0.41		0.64	0.17

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 20.6 — Intersection LOS: C
Intersection Capacity Utilization 58.5% — ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SWR
Lane Configurations	
Traffic Volume (vph)	45
Future Volume (vph)	45
Satd. Flow (prot)	1524
Flt Permitted	
Satd. Flow (perm)	1524
Satd. Flow (RTOR)	93
Lane Group Flow (vph)	60
Turn Type	Perm
Protected Phases	
Permitted Phases	8
Total Split (s)	37.0
Total Lost Time (s)	5.8
Act Effct Green (s)	25.2
Actuated g/C Ratio	0.25
v/c Ratio	0.13
Control Delay	2.9
Queue Delay	0.0
Total Delay	2.9
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	4
Internal Link Dist (ft)	
Turn Bay Length (ft)	580
Base Capacity (vph)	539
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.11

Intersection Summary

6: Bright Star Road & Brightstar Connector

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	110	74	265	185	39	251
Future Volume (Veh/h)	110	74	265	185	39	251
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.69	1.00	0.79	0.93	0.63	0.84
Hourly flow rate (vph)	159	74	335	199	62	299
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	758	335			335	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	758	335			335	
tC, single (s)	6.4	6.3			4.4	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.5	
p0 queue free %	55	89			94	
cM capacity (veh/h)	356	691			1079	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	159	74	335	199	62	299
Volume Left	159	0	0	0	62	0
Volume Right	0	74	0	199	0	0
cSH	356	691	1700	1700	1079	1700
Volume to Capacity	0.45	0.11	0.20	0.12	0.06	0.18
Queue Length 95th (ft)	56	9	0	0	5	0
Control Delay (s)	23.0	10.8	0.0	0.0	8.5	0.0
Lane LOS	C	B			A	
Approach Delay (s)	19.1		0.0		1.5	
Approach LOS	C					

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	33.4%	ICU Level of Service	A
Analysis Period (min)	15		

2020 Build Conditions: PM Peak Hour
(w/ Existing Geometry)

1: Bright Star Road & Private Drive/Wood Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	85	0	92	10	345	34	36	420	10
Future Volume (Veh/h)	0	0	5	85	0	92	10	345	34	36	420	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.25	0.25	0.92	0.92	0.50	0.86	0.25	0.25	0.88	0.50
Hourly flow rate (vph)	0	0	20	340	0	100	20	401	136	144	477	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1384	1352	487	1304	1294	469	497			537		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1384	1352	487	1304	1294	469	497			537		
tC, single (s)	7.1	6.5	6.2	7.3	6.5	6.4	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.5	2.2			2.4		
p0 queue free %	100	100	97	0	100	82	98			85		
cM capacity (veh/h)	86	125	585	108	137	552	1077			951		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	20	440	557	641
Volume Left	0	340	20	144
Volume Right	20	100	136	20
cSH	585	132	1077	951
Volume to Capacity	0.03	3.33	0.02	0.15
Queue Length 95th (ft)	3	Err	1	13
Control Delay (s)	11.4	Err	0.5	3.7
Lane LOS	B	F	A	A
Approach Delay (s)	11.4	Err	0.5	3.7
Approach LOS	B	F		

Intersection Summary				
Average Delay	2655.3			
Intersection Capacity Utilization	63.8%	ICU Level of Service	B	
Analysis Period (min)	15			

2: Bright Star Road & SR 8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	335	88	328	490	107	305
Future Volume (Veh/h)	335	88	328	490	107	305
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.75	0.91	0.82	0.88	0.96
Hourly flow rate (vph)	381	117	360	598	122	318
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				338		
pX, platoon unblocked					0.77	
vC, conflicting volume			381		1758	249
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			381		1833	249
tC, single (s)			4.2		7.0	7.3
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.5
p0 queue free %			69		0	54
cM capacity (veh/h)			1160		34	694

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	254	244	360	598	440
Volume Left	0	0	360	0	122
Volume Right	0	117	0	0	318
cSH	1700	1700	1160	1700	108
Volume to Capacity	0.15	0.14	0.31	0.35	4.08
Queue Length 95th (ft)	0	0	33	0	Err
Control Delay (s)	0.0	0.0	9.5	0.0	Err
Lane LOS			A		F
Approach Delay (s)	0.0		3.6		Err
Approach LOS					F

Intersection Summary			
Average Delay	2322.2		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	489	151	215	669	154	325
Future Volume (vph)	489	151	215	669	154	325
Satd. Flow (prot)	1845	1324	1805	1845	1656	1599
Flt Permitted			0.164		0.950	
Satd. Flow (perm)	1845	1324	312	1845	1656	1599
Satd. Flow (RTOR)		164				339
Lane Group Flow (vph)	556	164	259	760	241	339
Turn Type	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	6		5	2		
Permitted Phases		6	2		8	8
Total Split (s)	27.0	27.0	13.0	40.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	20.3	20.3	33.1	33.1	16.1	16.1
Actuated g/C Ratio	0.35	0.35	0.58	0.58	0.28	0.28
v/c Ratio	0.85	0.28	0.64	0.71	0.52	0.49
Control Delay	31.2	4.0	15.4	13.1	23.1	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.2	4.0	15.4	13.1	23.1	5.3
LOS	C	A	B	B	C	A
Approach Delay	25.0			13.7	12.7	
Approach LOS	C			B	B	
Queue Length 50th (ft)	172	0	38	162	74	0
Queue Length 95th (ft)	#311	31	79	260	89	53
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	746	632	416	1168	465	693
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.26	0.62	0.65	0.52	0.49

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 57.2
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 17.0 Intersection LOS: B
Intersection Capacity Utilization 56.2% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 5 & SR 8

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	5	0	20	80	0	35	40	346	10	10	459	85
Future Volume (Veh/h)	5	0	20	80	0	35	40	346	10	10	459	85
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	1.00	0.80	0.25	0.88	0.67	0.80	0.50	0.50	0.89	0.85
Hourly flow rate (vph)	20	0	20	100	0	40	60	433	20	20	516	100
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1209	1219	443	1189	1179	566	616			453		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1209	1219	443	1189	1179	566	616			453		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	100	97	34	100	92	94			98		
cM capacity (veh/h)	140	168	619	151	177	522	974			1118		

Direction, Lane #	NB 1	SB 1	SE 1	NW 1
Volume Total	40	140	513	636
Volume Left	20	100	60	20
Volume Right	20	40	20	100
cSH	228	190	974	1118
Volume to Capacity	0.18	0.74	0.06	0.02
Queue Length 95th (ft)	16	119	5	1
Control Delay (s)	24.1	63.8	1.7	0.5
Lane LOS	C	F	A	A
Approach Delay (s)	24.1	63.8	1.7	0.5
Approach LOS	C	F		

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	61.2%	ICU Level of Service	B	
Analysis Period (min)	15			

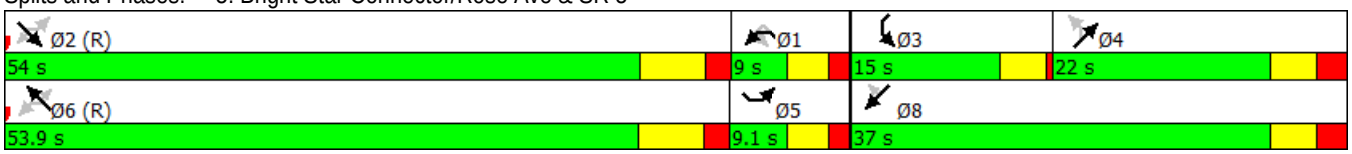
5: Bright Star Connector/Rose Ave & SR 5

Lane Group	SEL	SET	SER	NWU	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT
Lane Configurations												
Traffic Volume (vph)	95	386	55	10	69	489	335	35	85	225	310	135
Future Volume (vph)	95	386	55	10	69	489	335	35	85	225	310	135
Satd. Flow (prot)	1770	1792	1468	0	1754	1827	1599	1805	3138	0	3502	1863
Flt Permitted	0.364				0.438			0.633			0.950	
Satd. Flow (perm)	678	1792	1468	0	809	1827	1599	1203	3138	0	3502	1863
Satd. Flow (RTOR)			127				360		292			
Lane Group Flow (vph)	120	424	80	0	136	515	360	60	412	0	360	199
Turn Type	pm+pt	NA	Perm	custom	pm+pt	NA	Perm	Perm	NA		Prot	NA
Protected Phases	5	2			1	6			4		3	8
Permitted Phases	2		2	1	6		6	4				
Total Split (s)	9.1	54.0	54.0	9.0	9.0	53.9	53.9	22.0	22.0		15.0	37.0
Total Lost Time (s)	4.8	6.7	6.7		4.8	6.7	6.7	5.8	5.8		4.0	5.8
Act Effct Green (s)	59.0	52.8	52.8		58.8	52.7	52.7	10.7	10.7		11.0	25.7
Actuated g/C Ratio	0.59	0.53	0.53		0.59	0.53	0.53	0.11	0.11		0.11	0.26
v/c Ratio	0.27	0.45	0.10		0.26	0.54	0.36	0.47	0.69		0.94	0.42
Control Delay	11.2	17.4	1.0		10.7	19.1	2.7	52.3	18.8		77.4	32.9
Queue Delay	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0
Total Delay	11.2	17.4	1.0		10.7	19.1	2.7	52.3	18.8		77.4	32.9
LOS	B	B	A		B	B	A	D	B		E	C
Approach Delay		14.1				12.1			23.1			49.2
Approach LOS		B				B			C			D
Queue Length 50th (ft)	27	158	0		31	204	0	37	38		119	106
Queue Length 95th (ft)	50	267	0		37	340	47	46	42		#190	114
Internal Link Dist (ft)		179				236			1029			553
Turn Bay Length (ft)	300		300		200			210			330	
Base Capacity (vph)	446	945	834		515	962	1012	194	753		385	581
Starvation Cap Reductn	0	0	0		0	0	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0	0	0	0		0	0
Reduced v/c Ratio	0.27	0.45	0.10		0.26	0.54	0.36	0.31	0.55		0.94	0.34

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:SETL and 6:NWTL, Start of 1st Green
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 23.8 Intersection LOS: C
Intersection Capacity Utilization 67.2% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: Bright Star Connector/Rose Ave & SR 5



Lane Group	SWR
Lane Configurations	
Traffic Volume (vph)	145
Future Volume (vph)	145
Satd. Flow (prot)	1615
Flt Permitted	
Satd. Flow (perm)	1615
Satd. Flow (RTOR)	159
Lane Group Flow (vph)	159
Turn Type	Perm
Protected Phases	
Permitted Phases	8
Total Split (s)	37.0
Total Lost Time (s)	5.8
Act Effct Green (s)	25.7
Actuated g/C Ratio	0.26
v/c Ratio	0.30
Control Delay	5.9
Queue Delay	0.0
Total Delay	5.9
LOS	A
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	0
Queue Length 95th (ft)	44
Internal Link Dist (ft)	
Turn Bay Length (ft)	580
Base Capacity (vph)	613
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.26

Intersection Summary

6: Bright Star Road & Brightstar Connector

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	240	89	295	190	115	410
Future Volume (Veh/h)	240	89	295	190	115	410
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.75	0.93	0.73	0.75	0.96
Hourly flow rate (vph)	261	119	317	260	153	427
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1050	317			317	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1050	317			317	
tC, single (s)	6.4	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.3	
p0 queue free %	0	83			87	
cM capacity (veh/h)	222	710			1205	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	261	119	317	260	153	427
Volume Left	261	0	0	0	153	0
Volume Right	0	119	0	260	0	0
cSH	222	710	1700	1700	1205	1700
Volume to Capacity	1.18	0.17	0.19	0.15	0.13	0.25
Queue Length 95th (ft)	316	15	0	0	11	0
Control Delay (s)	162.3	11.1	0.0	0.0	8.4	0.0
Lane LOS	F	B			A	
Approach Delay (s)	115.0		0.0		2.2	
Approach LOS	F					

Intersection Summary			
Average Delay	29.3		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX I

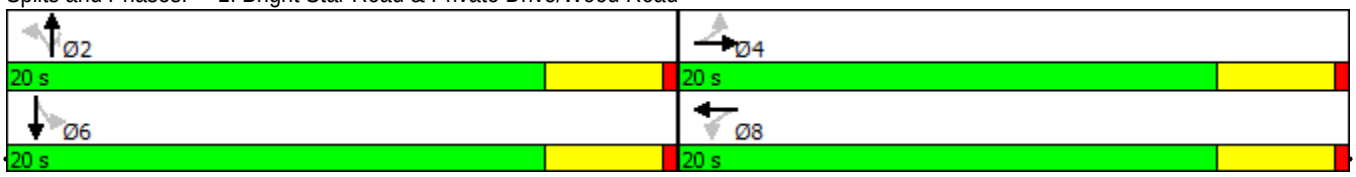
CAPACITY ANALYSIS: 2020 BUILD CONDITIONS
(w/ RECOMMENDED IMPROVEMENTS)

2020 Build Conditions: AM Peak Hour (w/ Recommended Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	10	35	0	33	5	225	114	122	245	0
Future Volume (vph)	0	0	10	35	0	33	5	225	114	122	245	0
Satd. Flow (prot)	0	1644	0	1583	1302	0	0	1716	1311	1394	1672	0
Flt Permitted				0.744				0.974		0.562	0.983	
Satd. Flow (perm)	0	1644	0	1240	1302	0	0	1676	1311	825	1647	0
Satd. Flow (RTOR)		445			441			6	112			
Peak Hour Factor	0.92	0.92	0.50	0.25	0.92	0.92	0.25	0.80	0.92	0.92	0.88	0.92
Heavy Vehicles (%)	2%	2%	0%	14%	0%	24%	0%	4%	17%	23%	7%	2%
Shared Lane Traffic (%)									10%	10%		
Lane Group Flow (vph)	0	20	0	140	36	0	0	313	112	120	291	0
Turn Type		NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Total Split (s)	20.0	20.0		20.0	20.0		20.0	20.0	20.0	20.0	20.0	
Total Lost Time (s)		4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Act Effct Green (s)		8.4		8.8	8.8			19.6	19.6	19.6	19.6	
Actuated g/C Ratio		0.28		0.30	0.30			0.66	0.66	0.66	0.66	
v/c Ratio		0.03		0.38	0.05			0.28	0.12	0.22	0.27	
Control Delay		0.1		12.0	0.2			6.5	2.3	7.6	6.5	
Queue Delay		0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay		0.1		12.0	0.2			6.5	2.3	7.6	6.5	
LOS		A		B	A			A	A	A	A	
Approach Delay		0.1			9.6			5.4			6.8	
Approach LOS		A			A			A			A	
Queue Length 50th (ft)		0		17	0			29	0	10	27	
Queue Length 95th (ft)		0		11	0			72	16	43	77	
Internal Link Dist (ft)		143			736			1503			2740	
Turn Bay Length (ft)									250	250		
Base Capacity (vph)		1102		679	913			1166	945	573	1144	
Starvation Cap Reductn		0		0	0			0	0	0	0	
Spillback Cap Reductn		0		0	0			0	0	0	0	
Storage Cap Reductn		0		0	0			0	0	0	0	
Reduced v/c Ratio		0.02		0.21	0.04			0.27	0.12	0.21	0.25	

Intersection Summary	
Cycle Length: 40	
Actuated Cycle Length: 29.8	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 6.6	Intersection LOS: A
Intersection Capacity Utilization 45.9%	ICU Level of Service A
Analysis Period (min) 15	

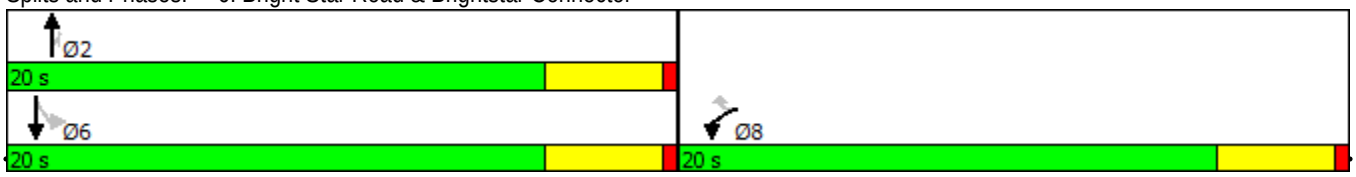
Splits and Phases: 1: Bright Star Road & Private Drive/Wood Road



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	110	74	265	185	39	251
Future Volume (vph)	110	74	265	185	39	251
Satd. Flow (prot)	1805	1482	1727	1583	1378	1743
Flt Permitted	0.950				0.559	
Satd. Flow (perm)	1805	1482	1727	1583	811	1743
Satd. Flow (RTOR)		74		199		
Peak Hour Factor	0.69	1.00	0.79	0.93	0.63	0.84
Heavy Vehicles (%)	0%	9%	10%	2%	31%	9%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	159	74	335	199	62	299
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	8.1	8.1	17.8	17.8	17.8	17.8
Actuated g/C Ratio	0.26	0.26	0.58	0.58	0.58	0.58
v/c Ratio	0.33	0.17	0.33	0.20	0.13	0.30
Control Delay	11.2	3.9	6.7	1.8	6.2	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	3.9	6.7	1.8	6.2	6.4
LOS	B	A	A	A	A	A
Approach Delay	8.9		4.9			6.4
Approach LOS	A		A			A
Queue Length 50th (ft)	18	0	29	0	5	25
Queue Length 95th (ft)	36	15	62	18	12	60
Internal Link Dist (ft)	3107		959			1503
Turn Bay Length (ft)				150	150	
Base Capacity (vph)	955	819	1072	1058	503	1082
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.09	0.31	0.19	0.12	0.28

Intersection Summary			
Cycle Length: 40			
Actuated Cycle Length: 30.7			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.33			
Intersection Signal Delay: 6.2		Intersection LOS: A	
Intersection Capacity Utilization 33.4%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 6: Bright Star Road & Brightstar Connector



2: Bright Star Road & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	445	110	292	270	43	190
Future Volume (vph)	445	110	292	270	43	190
Satd. Flow (prot)	3141	0	1656	1681	1517	1495
Flt Permitted			0.308		0.950	
Satd. Flow (perm)	3141	0	537	1681	1517	1495
Satd. Flow (RTOR)	94					
Lane Group Flow (vph)	642	0	370	300	57	202
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	6		5	2	8	5
Permitted Phases			2			8
Total Split (s)	39.0		21.0	60.0	20.0	21.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Act Effct Green (s)	35.1		55.4	55.4	13.1	33.4
Actuated g/C Ratio	0.46		0.72	0.72	0.17	0.44
v/c Ratio	0.43		0.59	0.25	0.22	0.31
Control Delay	13.4		7.7	4.1	29.4	15.3
Queue Delay	0.0		0.0	0.3	0.0	0.0
Total Delay	13.4		7.7	4.4	29.4	15.3
LOS	B		A	A	C	B
Approach Delay	13.4			6.2	18.4	
Approach LOS	B			A	B	
Queue Length 50th (ft)	91		61	49	24	60
Queue Length 95th (ft)	140		76	71	46	106
Internal Link Dist (ft)	785			258	2740	
Turn Bay Length (ft)			90			300
Base Capacity (vph)	1492		638	1233	318	667
Starvation Cap Reductn	0		0	454	0	0
Spillback Cap Reductn	47		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.44		0.58	0.39	0.18	0.30

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 76.5
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 11.2 — Intersection LOS: B
Intersection Capacity Utilization 45.3% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Bright Star Road & SR 8

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	495	140	270	444	118	155
Future Volume (vph)	495	140	270	444	118	155
Satd. Flow (prot)	1776	1417	1770	1759	1480	1524
Flt Permitted			0.281		0.950	
Satd. Flow (perm)	1776	1417	523	1759	1480	1524
Satd. Flow (RTOR)		157				199
Lane Group Flow (vph)	505	157	342	522	182	199
Turn Type	NA	Perm	pm+pt	NA	Perm	Free
Protected Phases	6		5	2		
Permitted Phases		6	2		8	Free
Total Split (s)	39.0	39.0	21.0	60.0	20.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	
Act Effct Green (s)	35.1	35.1	55.4	55.4	13.1	76.5
Actuated g/C Ratio	0.46	0.46	0.72	0.72	0.17	1.00
v/c Ratio	0.62	0.21	0.53	0.41	0.72	0.13
Control Delay	17.3	2.7	7.2	5.7	46.7	0.2
Queue Delay	0.2	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	2.7	7.2	5.7	46.7	0.2
LOS	B	A	A	A	D	A
Approach Delay	14.0			6.3	22.4	
Approach LOS	B			A	C	
Queue Length 50th (ft)	112	1	48	84	84	0
Queue Length 95th (ft)	331	11	71	132	101	0
Internal Link Dist (ft)	258			785	2136	
Turn Bay Length (ft)			200			150
Base Capacity (vph)	814	735	656	1291	310	1524
Starvation Cap Reductn	44	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.21	0.52	0.40	0.59	0.13

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 76.5
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 12.2 — Intersection LOS: B
Intersection Capacity Utilization 57.5% — ICU Level of Service B
Analysis Period (min) 15

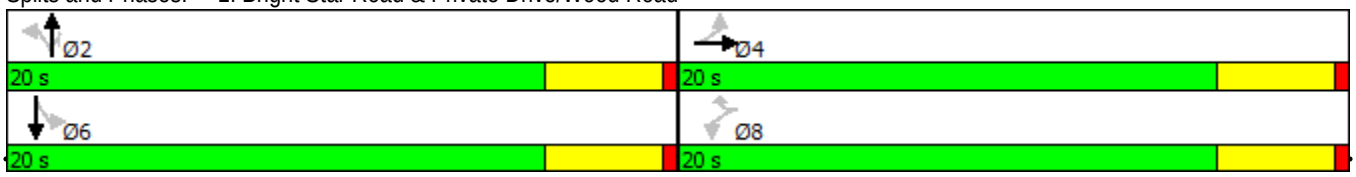
Splits and Phases: 3: SR 5 & SR 8

2020 Build Conditions: PM Peak Hour
(w/ Recommended Improvements)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	85	0	92	10	345	34	36	420	10
Future Volume (vph)	0	0	5	85	0	92	10	345	34	36	420	10
Satd. Flow (prot)	0	1644	0	1556	0	1302	0	1878	1404	1517	1836	0
Flt Permitted				0.800				0.973		0.516		
Satd. Flow (perm)	0	1644	0	1310	0	1302	0	1831	1404	824	1836	0
Satd. Flow (RTOR)		230				100			136		6	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.92	0.92	0.50	0.86	0.25	0.25	0.88	0.50
Heavy Vehicles (%)	2%	2%	0%	16%	0%	24%	0%	1%	15%	19%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	0	92	0	100	0	421	136	144	497	0
Turn Type		NA		Perm		Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4			8		8	2		2	6		
Total Split (s)	20.0	20.0		20.0		20.0	20.0	20.0	20.0	20.0	20.0	
Total Lost Time (s)		4.0		4.0		4.0		4.0	4.0	4.0	4.0	
Act Effct Green (s)		7.6		7.8		7.8		21.1	21.1	21.1	21.1	
Actuated g/C Ratio		0.25		0.26		0.26		0.69	0.69	0.69	0.69	
v/c Ratio		0.03		0.27		0.24		0.33	0.13	0.25	0.39	
Control Delay		0.2		11.6		4.4		5.8	1.9	6.8	6.2	
Queue Delay		0.0		0.0		0.0		0.0	0.0	0.0	0.0	
Total Delay		0.2		11.6		4.4		5.8	1.9	6.8	6.2	
LOS		A		B		A		A	A	A	A	
Approach Delay		0.2			7.9			4.8			6.3	
Approach LOS		A			A			A			A	
Queue Length 50th (ft)		0		13		0		38	0	12	46	
Queue Length 95th (ft)		0		33		18		87	0	8	111	
Internal Link Dist (ft)		143			736			1503			2740	
Turn Bay Length (ft)									250	250		
Base Capacity (vph)		983		698		741		1263	1011	568	1269	
Starvation Cap Reductn		0		0		0		0	0	0	0	
Spillback Cap Reductn		0		0		0		0	0	0	0	
Storage Cap Reductn		0		0		0		0	0	0	0	
Reduced v/c Ratio		0.02		0.13		0.13		0.33	0.13	0.25	0.39	

Intersection Summary		
Cycle Length: 40		
Actuated Cycle Length: 30.5		
Control Type: Actuated-Uncoordinated		
Maximum v/c Ratio: 0.39		
Intersection Signal Delay: 5.9	Intersection LOS: A	
Intersection Capacity Utilization 48.0%	ICU Level of Service A	
Analysis Period (min) 15		

Splits and Phases: 1: Bright Star Road & Private Drive/Wood Road



2: Bright Star Road & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø3
Lane Configurations							
Traffic Volume (vph)	335	88	328	490	107	305	
Future Volume (vph)	335	88	328	490	107	305	
Satd. Flow (prot)	3312	0	1736	1845	1671	1324	
Flt Permitted			0.372		0.950		
Satd. Flow (perm)	3312	0	680	1845	1671	1324	
Satd. Flow (RTOR)	79						
Lane Group Flow (vph)	498	0	360	598	122	318	
Turn Type	NA		pm+pt	NA	Prot	pm+ov	
Protected Phases	6		5	2	8	5	3
Permitted Phases			2			8	
Total Split (s)	27.0		13.0	40.0	20.0	13.0	20.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0	
Act Effct Green (s)	23.1		36.2	36.2	12.2	25.3	
Actuated g/C Ratio	0.41		0.64	0.64	0.22	0.45	
v/c Ratio	0.36		0.60	0.51	0.34	0.54	
Control Delay	11.0		7.8	5.3	21.0	15.1	
Queue Delay	0.0		0.0	0.4	0.0	0.0	
Total Delay	11.0		7.8	5.7	21.0	15.1	
LOS	B		A	A	C	B	
Approach Delay	11.0			6.5	16.7		
Approach LOS	B			A	B		
Queue Length 50th (ft)	48		42	72	35	73	
Queue Length 95th (ft)	85		78	95	71	136	
Internal Link Dist (ft)	785			258	2740		
Turn Bay Length (ft)			200			300	
Base Capacity (vph)	1402		605	1182	475	592	
Starvation Cap Reductn	0		2	208	0	0	
Spillback Cap Reductn	84		0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	
Reduced v/c Ratio	0.38		0.60	0.61	0.26	0.54	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 56.4
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 10.1 — Intersection LOS: B
Intersection Capacity Utilization 46.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: Bright Star Road & SR 8

3: SR 5 & SR 8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø8
Lane Configurations							
Traffic Volume (vph)	489	151	215	669	154	325	
Future Volume (vph)	489	151	215	669	154	325	
Satd. Flow (prot)	1845	1324	1805	1845	1656	1599	
Flt Permitted			0.206		0.950		
Satd. Flow (perm)	1845	1324	391	1845	1656	1599	
Satd. Flow (RTOR)		164					
Lane Group Flow (vph)	556	164	259	760	241	339	
Turn Type	NA	Perm	pm+pt	NA	pm+pt	Free	
Protected Phases	6		5	2	3		8
Permitted Phases		6	2		8	Free	
Total Split (s)	27.0	27.0	13.0	40.0	20.0		20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		
Act Effct Green (s)	23.1	23.1	36.2	36.2	12.2	56.4	
Actuated g/C Ratio	0.41	0.41	0.64	0.64	0.22	1.00	
v/c Ratio	0.74	0.26	0.54	0.64	0.67	0.21	
Control Delay	21.4	4.0	9.9	10.2	30.0	0.3	
Queue Delay	0.3	0.0	0.0	0.0	0.0	0.0	
Total Delay	21.7	4.0	9.9	10.2	30.0	0.3	
LOS	C	A	A	B	C	A	
Approach Delay	17.7			10.1	12.7		
Approach LOS	B			B	B		
Queue Length 50th (ft)	122	5	31	134	74	0	
Queue Length 95th (ft)	#322	22	61	260	89	0	
Internal Link Dist (ft)	258			785	2136		
Turn Bay Length (ft)			200			150	
Base Capacity (vph)	755	638	477	1182	471	1599	
Starvation Cap Reductn	24	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	
Reduced v/c Ratio	0.76	0.26	0.54	0.64	0.51	0.21	

Intersection Summary

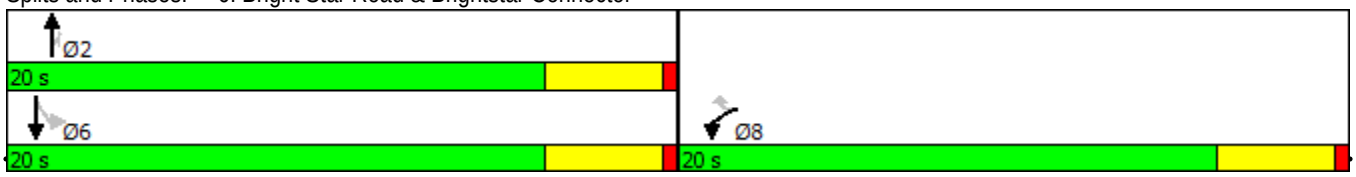
Cycle Length: 60
Actuated Cycle Length: 56.4
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 56.2% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: SR 5 & SR 8

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	240	89	295	190	115	410
Future Volume (vph)	240	89	295	190	115	410
Satd. Flow (prot)	1805	1495	1845	1599	1656	1845
Flt Permitted	0.950				0.568	
Satd. Flow (perm)	1805	1495	1845	1599	990	1845
Satd. Flow (RTOR)		119		260		
Peak Hour Factor	0.92	0.75	0.93	0.73	0.75	0.96
Heavy Vehicles (%)	0%	8%	3%	1%	9%	3%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	119	317	260	153	427
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Act Effct Green (s)	9.8	9.8	16.8	16.8	16.8	16.8
Actuated g/C Ratio	0.31	0.31	0.54	0.54	0.54	0.54
v/c Ratio	0.46	0.22	0.32	0.27	0.29	0.43
Control Delay	11.9	3.4	7.7	2.2	8.9	8.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	3.4	7.7	2.2	8.9	8.7
LOS	B	A	A	A	A	A
Approach Delay	9.2		5.2			8.8
Approach LOS	A		A			A
Queue Length 50th (ft)	31	0	31	0	15	45
Queue Length 95th (ft)	78	13	86	14	40	121
Internal Link Dist (ft)	3107		959			1503
Turn Bay Length (ft)				150	150	
Base Capacity (vph)	945	839	1101	1059	590	1101
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.14	0.29	0.25	0.26	0.39

Intersection Summary	
Cycle Length: 40	
Actuated Cycle Length: 31.3	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 7.5	Intersection LOS: A
Intersection Capacity Utilization 45.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 6: Bright Star Road & Brightstar Connector



2020 Build Conditions: Roundabout Analysis - AM Peak Hour

LANE SUMMARY

Site: 101 [BRIGHT STAR @ CONN.]

New Site
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: BRIGHT STAR RD													
Lane 1[d]	538	2.1	1309	0.411	100	6.7	LOS A	3.3	83.7	Full	1600	0.0	0.0
Approach	538	2.1		0.411		6.7	LOS A	3.3	83.7				
East: BRIGHT STAR CONNECTOR													
Lane 1[d]	120	0.0	1364	0.088	100	3.3	LOS A	0.5	12.7	Full	1600	0.0	0.0
Lane 2	99	8.0	1030	0.096	100	4.3	LOS A	0.5	14.0	Full	1600	0.0	0.0
Approach	218	3.6		0.096		3.8	LOS A	0.5	14.0				
North: BRIGHT STAR RD													
Lane 1[d]	313	4.0	1202	0.261	100	5.4	LOS A	1.7	44.5	Full	1600	0.0	0.0
Approach	313	4.0		0.261		5.4	LOS A	1.7	44.5				
Intersection	1070	2.9		0.411		5.7	LOS A	3.3	83.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: WILBURN ENGINEERING | Processed: Wednesday, December 28, 2016 2:35:20 PM
Project: P:\16-125 The Silverman Group, Bright Star Road DRI\Roundabout Analysis\2020 Build - Bright Star and Connector - AM.sip7

2020 Build Conditions: Roundabout Analysis - PM Peak Hour

LANE SUMMARY

Site: 101 [BRIGHT STAR @ CONN.]

New Site
Roundabout

Lane Use and Performance	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: BRIGHT STAR RD													
Lane 1[d]	577	2.1	1160	0.498	100	8.6	LOS A	4.4	111.3	Full	1600	0.0	0.0
Approach	577	2.1		0.498		8.6	LOS A	4.4	111.3				
East: BRIGHT STAR CONNECTOR													
Lane 1[d]	261	0.0	1304	0.200	100	4.5	LOS A	1.3	33.6	Full	1600	0.0	0.0
Lane 2	119	8.0	899	0.132	100	5.3	LOS A	0.8	20.5	Full	1600	0.0	0.0
Approach	380	2.5		0.200		4.7	LOS A	1.3	33.6				
North: BRIGHT STAR RD													
Lane 1[d]	580	4.6	1041	0.558	100	10.5	LOS B	4.8	124.0	Full	1600	0.0	0.0
Approach	580	4.6		0.558		10.5	LOS B	4.8	124.0				
Intersection	1537	3.1		0.558		8.4	LOS A	4.8	124.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: SIDRA Standard.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Organisation: WILBURN ENGINEERING | Processed: Wednesday, December 28, 2016 2:38:32 PM
Project: P:\16-125 The Silverman Group, Bright Star Road DRI\Roundabout Analysis\2020 Build - Bright Star and Connector - PM.sip7

APPENDIX J
ROADWAY SEGMENT ANALYSIS

Existing Conditions: AM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	Bright Star Road
From/To	Wood to SR 8
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd 251 veh/h
Opposing direction volume, Vo 204 veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.4	1.5
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adj. factor,(note-5) fHV	0.984	0.980
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	290 pc/h	237 pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	3.8	mi/h
Average travel speed, ATSd	27.2	mi/h
Percent Free Flow Speed, PFFS	77.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.996	0.996
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	286 pc/h	233 pc/h
Base percent time-spent-following,(note-4) BPTSFd	29.7 %	
Adjustment for no-passing zones, fnp	57.8	
Percent time-spent-following, PTSFd	61.6 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.17	
Peak 15-min vehicle-miles of travel, VMT15	36	veh-mi
Peak-hour vehicle-miles of travel, VMT60	126	veh-mi
Peak 15-min total travel time, TT15	1.3	veh-h
Capacity from ATS, CdATS	1666	veh/h
Capacity from PTSF, CdPTSF	1693	veh/h
Directional Capacity	1666	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	27.2	mi/h
Percent time-spent-following, PTSFd (from above)	61.6	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	285.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.75
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 8
From/To	Bright Star to SR 5
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	8	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd	573	veh/h
Opposing direction volume, Vo	456	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.2	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.992		0.984	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	656	pc/h	527	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	2.1	mi/h
Average travel speed, ATSd	33.7	mi/h
Percent Free Flow Speed, PFFS	74.9	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	651 pc/h	518 pc/h
Base percent time-spent-following,(note-4) BPTSFd	59.6 %	
Adjustment for no-passing zones, fnp	33.9	
Percent time-spent-following, PTSFd	78.5 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.39	
Peak 15-min vehicle-miles of travel, VMT15	16	veh-mi
Peak-hour vehicle-miles of travel, VMT60	57	veh-mi
Peak 15-min total travel time, TT15	0.5	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1673	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	33.7	mi/h
Percent time-spent-following, PTSFd (from above)	78.5	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	651.1
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.46
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd 366 veh/h
Opposing direction volume, Vo 222 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.982		0.977	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	424	pc/h	258	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	3.6	mi/h
Average travel speed, ATSd	30.3	mi/h
Percent Free Flow Speed, PFFS	77.3	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	416 pc/h	254 pc/h
Base percent time-spent-following,(note-4) BPTSFd	40.7 %	
Adjustment for no-passing zones, fnp	48.4	
Percent time-spent-following, PTSFd	70.8 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	42	veh-mi
Peak-hour vehicle-miles of travel, VMT60	146	veh-mi
Peak 15-min total travel time, TT15	1.4	veh-h
Capacity from ATS, CdATS	1661	veh/h
Capacity from PTSF, CdPTSF	1690	veh/h
Directional Capacity	1661	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	30.3	mi/h
Percent time-spent-following, PTSFd (from above)	70.8	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	415.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.54
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	Gurley to Connector
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	7	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 372 veh/h
Opposing direction volume, Vo 357 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.979		0.979	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	432	pc/h	414	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	2.1	mi/h
Average travel speed, ATSd	32.6	mi/h
Percent Free Flow Speed, PFFS	79.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	423 pc/h	406 pc/h
Base percent time-spent-following,(note-4) BPTSFd	43.8 %	
Adjustment for no-passing zones, fnp	42.9	
Percent time-spent-following, PTSFd	65.7 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.25	
Peak 15-min vehicle-miles of travel, VMT15	74	veh-mi
Peak-hour vehicle-miles of travel, VMT60	260	veh-mi
Peak 15-min total travel time, TT15	2.3	veh-h
Capacity from ATS, CdATS	1664	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1664	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	32.6	mi/h
Percent time-spent-following, PTSFd (from above)	65.7	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	422.7
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.88
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst:	MM
Agency/Co:	Wilburn Engineering
Date:	12/22/2016
Analysis Period:	AM Peak Hour
Highway:	Connector
From/To:	SR 5 to Bright Star
Jurisdiction:	
Analysis Year:	2017 (Existing)
Project ID:	Bright Star DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	185	vph	90	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	53		26	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	107	pcphpl	52	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	107	pcphpl	52	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	2.4	pc/mi/ln	1.2	pc/mi/ln

Bicycle Level of Service

Posted speed limit, Sp		55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	105.1	51.1
Effective width of outside lane, We	24.00	33.90
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	1.97	-1.26
Bicycle LOS	B	A

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	Bright Star
From/To	Connector to Wood
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	235	veh/h
Opposing direction volume, Vo	200	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.5	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.977		0.971	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	273	pc/h	234	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	3.8	mi/h
Average travel speed, ATSd	35.5	mi/h
Percent Free Flow Speed, PFFS	82.2	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.1	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	0.994	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	269 pc/h	229 pc/h
Base percent time-spent-following,(note-4) BPTSFd	28.4 %	
Adjustment for no-passing zones, fnp	59.0	
Percent time-spent-following, PTSFd	60.3 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.16	
Peak 15-min vehicle-miles of travel, VMT15	20	veh-mi
Peak-hour vehicle-miles of travel, VMT60	71	veh-mi
Peak 15-min total travel time, TT15	0.6	veh-h
Capacity from ATS, CdATS	1651	veh/h
Capacity from PTSF, CdPTSF	1690	veh/h
Directional Capacity	1651	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	35.5	mi/h
Percent time-spent-following, PTSFd (from above)	60.3	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	267.0
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.32
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Existing Conditions: PM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star
From/To	Wood to SR 8
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd 352 veh/h
Opposing direction volume, Vo 324 veh/h

Average Travel Speed

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.3	1.3
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adj. factor,(note-5) fHV	0.994	0.994
Grade adj. factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	402 pc/h	370 pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	2.9	mi/h
Average travel speed, ATSd	26.1	mi/h
Percent Free Flow Speed, PFFS	74.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.998		0.998	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	401	pc/h	369	pc/h
Base percent time-spent-following,(note-4) BPTSFd	42.7	%		
Adjustment for no-passing zones, fnp	47.1			
Percent time-spent-following, PTSFd	67.2	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.24	
Peak 15-min vehicle-miles of travel, VMT15	50	veh-mi
Peak-hour vehicle-miles of travel, VMT60	176	veh-mi
Peak 15-min total travel time, TT15	1.9	veh-h
Capacity from ATS, CdATS	1690	veh/h
Capacity from PTSF, CdPTSF	1697	veh/h
Directional Capacity	1690	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	26.1	mi/h
Percent time-spent-following, PTSFd (from above)	67.2	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	400.0
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.40
Bicycle LOS	B

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 8
From/To	Bright Star to SR 5
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	3	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd	757	veh/h
Opposing direction volume, Vo	552	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	1.000		0.997	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	860	pc/h	629	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATSd	31.7	mi/h
Percent Free Flow Speed, PFFS	70.5	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	860	pc/h	627	pc/h
Base percent time-spent-following,(note-4) BPTSFd	70.1	%		
Adjustment for no-passing zones, fnp	26.1			
Percent time-spent-following, PTSFd	85.2	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.51	
Peak 15-min vehicle-miles of travel, VMT15	22	veh-mi
Peak-hour vehicle-miles of travel, VMT60	76	veh-mi
Peak 15-min total travel time, TT15	0.7	veh-h
Capacity from ATS, CdATS	1695	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1695	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	31.7	mi/h
Percent time-spent-following, PTSFd (from above)	85.2	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	860.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.04
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd	454	veh/h
Opposing direction volume, Vo	301	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.992		0.984	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	520	pc/h	348	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	3.0	mi/h
Average travel speed, ATSd	29.5	mi/h
Percent Free Flow Speed, PFFS	75.1	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.996
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	516 pc/h	343 pc/h
Base percent time-spent-following,(note-4) BPTSFd	50.2 %	
Adjustment for no-passing zones, fnp	39.8	
Percent time-spent-following, PTSFd	74.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.31	
Peak 15-min vehicle-miles of travel, VMT15	52	veh-mi
Peak-hour vehicle-miles of travel, VMT60	182	veh-mi
Peak 15-min total travel time, TT15	1.8	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1693	veh/h
Directional Capacity	1673	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	29.5	mi/h
Percent time-spent-following, PTSFd (from above)	74.1	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	515.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.05
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	Gurley to Connector
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 595 veh/h
Opposing direction volume, Vo 359 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.998		0.994	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	677	pc/h	410	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	2.1	mi/h
Average travel speed, ATSd	30.7	mi/h
Percent Free Flow Speed, PFFS	74.4	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	676	pc/h	408	pc/h
Base percent time-spent-following,(note-4) BPTSFd	58.9	%		
Adjustment for no-passing zones, fnp	31.5			
Percent time-spent-following, PTSFd	78.5	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.40	
Peak 15-min vehicle-miles of travel, VMT15	118	veh-mi
Peak-hour vehicle-miles of travel, VMT60	416	veh-mi
Peak 15-min total travel time, TT15	3.8	veh-h
Capacity from ATS, CdATS	1690	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1690	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	30.7	mi/h
Percent time-spent-following, PTSFd (from above)	78.5	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	676.1
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.66
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: MM
Agency/Co: Wilburn Engineering
Date: 12/22/2016
Analysis Period: PM Peak Hour
Highway: Connector
From/To: SR 5 to Bright Star
Jurisdiction:
Analysis Year: 2017 (Existing)
Project ID: Bright Star DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	235	vph	215	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	67		61	
Trucks and buses	2	%	2	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.982		0.982	
Flow rate, vp	135	pcphpl	124	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	135	pcphpl	124	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	3.0	pc/mi/ln	2.8	pc/mi/ln

_____ Bicycle Level of Service _____

Posted speed limit, Sp	55	55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	133.5	122.2
Effective width of outside lane, We	24.00	24.00
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	1.84	1.79
Bicycle LOS	B	B

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star
From/To	Connector to Wood
Jurisdiction	
Analysis Year	2017 (Existing)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	400	veh/h
Opposing direction volume, Vo	326	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.996		0.994	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	456	pc/h	373	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	2.9	mi/h
Average travel speed, ATSd	33.9	mi/h
Percent Free Flow Speed, PFFS	78.5	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.998
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	455 pc/h	371 pc/h
Base percent time-spent-following,(note-4) BPTSFd	46.3 %	
Adjustment for no-passing zones, fnp	43.2	
Percent time-spent-following, PTSFd	70.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.27	
Peak 15-min vehicle-miles of travel, VMT15	34	veh-mi
Peak-hour vehicle-miles of travel, VMT60	120	veh-mi
Peak 15-min total travel time, TT15	1.0	veh-h
Capacity from ATS, CdATS	1690	veh/h
Capacity from PTSF, CdPTSF	1697	veh/h
Directional Capacity	1690	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	33.9	mi/h
Percent time-spent-following, PTSFd (from above)	70.1	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	454.5
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.46
Bicycle LOS	B

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

2020 No-Build Conditions: AM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	Bright Star Road
From/To	Wood to SR 8
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd	280	veh/h
Opposing direction volume, Vo	225	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.984		0.984	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	323	pc/h	260	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	3.6	mi/h
Average travel speed, ATSd	26.9	mi/h
Percent Free Flow Speed, PFFS	76.8	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.996		0.996	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	319	pc/h	257	pc/h
Base percent time-spent-following,(note-4) BPTSFd	33.2	%		
Adjustment for no-passing zones, fnp	56.2			
Percent time-spent-following, PTSFd	64.3	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.19	
Peak 15-min vehicle-miles of travel, VMT15	40	veh-mi
Peak-hour vehicle-miles of travel, VMT60	140	veh-mi
Peak 15-min total travel time, TT15	1.5	veh-h
Capacity from ATS, CdATS	1673	veh/h
Capacity from PTSF, CdPTSF	1693	veh/h
Directional Capacity	1673	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	26.9	mi/h
Percent time-spent-following, PTSFd (from above)	64.3	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	318.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.80
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 8
From/To	Bright Star to SR 5
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	8	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd	615	veh/h
Opposing direction volume, Vo	490	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.992		0.992	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	704	pc/h	561	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	2.0	mi/h
Average travel speed, ATSd	33.2	mi/h
Percent Free Flow Speed, PFFS	73.8	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	699 pc/h	557 pc/h
Base percent time-spent-following,(note-4) BPTSFd	63.0 %	
Adjustment for no-passing zones, fnp	31.6	
Percent time-spent-following, PTSFd	80.6 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.41	
Peak 15-min vehicle-miles of travel, VMT15	17	veh-mi
Peak-hour vehicle-miles of travel, VMT60	62	veh-mi
Peak 15-min total travel time, TT15	0.5	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	33.2	mi/h
Percent time-spent-following, PTSFd (from above)	80.6	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	698.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.49
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd	395	veh/h
Opposing direction volume, Vo	255	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.982		0.977	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	457	pc/h	297	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	3.4	mi/h
Average travel speed, ATSd	30.0	mi/h
Percent Free Flow Speed, PFFS	76.5	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.994
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	449 pc/h	292 pc/h
Base percent time-spent-following,(note-4) BPTSFd	44.9 %	
Adjustment for no-passing zones, fnp	44.7	
Percent time-spent-following, PTSFd	72.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.27	
Peak 15-min vehicle-miles of travel, VMT15	45	veh-mi
Peak-hour vehicle-miles of travel, VMT60	158	veh-mi
Peak 15-min total travel time, TT15	1.5	veh-h
Capacity from ATS, CdATS	1661	veh/h
Capacity from PTSF, CdPTSF	1690	veh/h
Directional Capacity	1661	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	30.0	mi/h
Percent time-spent-following, PTSFd (from above)	72.0	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	448.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.58
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	Gurley to Connector
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	7	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd	410	veh/h
Opposing direction volume, Vo	395	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.986		0.979	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	473	pc/h	458	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	1.9	mi/h
Average travel speed, ATSd	32.1	mi/h
Percent Free Flow Speed, PFFS	77.8	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	466	pc/h	449	pc/h
Base percent time-spent-following,(note-4) BPTSFd	48.8	%		
Adjustment for no-passing zones, fnp	40.4			
Percent time-spent-following, PTSFd	69.4	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.28	
Peak 15-min vehicle-miles of travel, VMT15	82	veh-mi
Peak-hour vehicle-miles of travel, VMT60	287	veh-mi
Peak 15-min total travel time, TT15	2.6	veh-h
Capacity from ATS, CdATS	1664	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1664	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	32.1	mi/h
Percent time-spent-following, PTSFd (from above)	69.4	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	465.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.93
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst:	MM
Agency/Co:	Wilburn Engineering
Date:	12/22/2016
Analysis Period:	AM Peak Hour
Highway:	Connector
From/To:	SR 5 to Bright Star
Jurisdiction:	
Analysis Year:	2020 (No-Build)
Project ID:	Bright Star DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	210	vph	125	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	60		36	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	122	pcphpl	72	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	122	pcphpl	72	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	2.7	pc/mi/ln	1.6	pc/mi/ln

Bicycle Level of Service

Posted speed limit, Sp	55	55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	119.3	71.0
Effective width of outside lane, We	24.00	30.75
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	2.03	-0.08
Bicycle LOS	B	A

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	Bright Star
From/To	Connector to Wood
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	6	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	260	veh/h
Opposing direction volume, Vo	225	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.4		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.977		0.977	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	302	pc/h	262	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	3.6	mi/h
Average travel speed, ATSd	35.3	mi/h
Percent Free Flow Speed, PFFS	81.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.994		0.994	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	297	pc/h	257	pc/h
Base percent time-spent-following,(note-4) BPTSFd	31.4	%		
Adjustment for no-passing zones, fnp	57.5			
Percent time-spent-following, PTSFd	62.2	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.18	
Peak 15-min vehicle-miles of travel, VMT15	22	veh-mi
Peak-hour vehicle-miles of travel, VMT60	78	veh-mi
Peak 15-min total travel time, TT15	0.6	veh-h
Capacity from ATS, CdATS	1661	veh/h
Capacity from PTSF, CdPTSF	1690	veh/h
Directional Capacity	1661	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	35.3	mi/h
Percent time-spent-following, PTSFd (from above)	62.2	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	295.5
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.37
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

2020 No-Build Conditions: PM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star Road
From/To	Wood to SR 8
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd	385	veh/h
Opposing direction volume, Vo	345	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.994		0.994	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	440	pc/h	394	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	2.7	mi/h
Average travel speed, ATSd	25.8	mi/h
Percent Free Flow Speed, PFFS	73.7	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.998
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	438 pc/h	393 pc/h
Base percent time-spent-following,(note-4) BPTSFd	45.7 %	
Adjustment for no-passing zones, fnp	44.3	
Percent time-spent-following, PTSFd	69.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.26	
Peak 15-min vehicle-miles of travel, VMT15	55	veh-mi
Peak-hour vehicle-miles of travel, VMT60	193	veh-mi
Peak 15-min total travel time, TT15	2.1	veh-h
Capacity from ATS, CdATS	1690	veh/h
Capacity from PTSF, CdPTSF	1697	veh/h
Directional Capacity	1690	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	25.8	mi/h
Percent time-spent-following, PTSFd (from above)	69.0	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	437.5
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.44
Bicycle LOS	B

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 8
From/To	Bright Star to SR 5
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	3	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd	805	veh/h
Opposing direction volume, Vo	585	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	1.000		0.997	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	915	pc/h	667	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATSd	31.1	mi/h
Percent Free Flow Speed, PFFS	69.2	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	915	pc/h	665	pc/h
Base percent time-spent-following,(note-4) BPTSFd	72.4	%		
Adjustment for no-passing zones, fnp	24.6			
Percent time-spent-following, PTSFd	86.6	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.54	
Peak 15-min vehicle-miles of travel, VMT15	23	veh-mi
Peak-hour vehicle-miles of travel, VMT60	81	veh-mi
Peak 15-min total travel time, TT15	0.7	veh-h
Capacity from ATS, CdATS	1695	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1695	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	31.1	mi/h
Percent time-spent-following, PTSFd (from above)	86.6	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	914.8
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.07
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd	485	veh/h
Opposing direction volume, Vo	325	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.996		0.988	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	553	pc/h	374	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	2.9	mi/h
Average travel speed, ATSd	29.2	mi/h
Percent Free Flow Speed, PFFS	74.4	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.996
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	551 pc/h	371 pc/h
Base percent time-spent-following,(note-4) BPTSFd	52.5 %	
Adjustment for no-passing zones, fnp	38.5	
Percent time-spent-following, PTSFd	75.5 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.32	
Peak 15-min vehicle-miles of travel, VMT15	55	veh-mi
Peak-hour vehicle-miles of travel, VMT60	194	veh-mi
Peak 15-min total travel time, TT15	1.9	veh-h
Capacity from ATS, CdATS	1680	veh/h
Capacity from PTSF, CdPTSF	1693	veh/h
Directional Capacity	1680	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	29.2	mi/h
Percent time-spent-following, PTSFd (from above)	75.5	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	551.1
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.08
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	Gurley to Connector
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 655 veh/h
Opposing direction volume, Vo 405 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.2	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.998		0.996	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	746	pc/h	462	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	1.9	mi/h
Average travel speed, ATSd	30.0	mi/h
Percent Free Flow Speed, PFFS	72.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	744	pc/h	460	pc/h
Base percent time-spent-following,(note-4) BPTSFd	63.4	%		
Adjustment for no-passing zones, fnp	29.2			
Percent time-spent-following, PTSFd	81.4	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.44	
Peak 15-min vehicle-miles of travel, VMT15	130	veh-mi
Peak-hour vehicle-miles of travel, VMT60	458	veh-mi
Peak 15-min total travel time, TT15	4.3	veh-h
Capacity from ATS, CdATS	1693	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1693	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	30.0	mi/h
Percent time-spent-following, PTSFd (from above)	81.4	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	744.3
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.71
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst:	MM
Agency/Co:	Wilburn Engineering
Date:	12/22/2016
Analysis Period:	PM Peak Hour
Highway:	Connector
From/To:	SR 5 to Bright Star
Jurisdiction:	
Analysis Year:	2020 (No-Build)
Project ID:	Bright Star DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	265	vph	245	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	75		70	
Trucks and buses	2	%	2	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.982		0.982	
Flow rate, vp	153	pcphpl	141	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	153	pcphpl	141	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	3.4	pc/mi/ln	3.1	pc/mi/ln

_____ Bicycle Level of Service _____

Posted speed limit, Sp	55	55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	150.6	139.2
Effective width of outside lane, We	24.00	24.00
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	1.90	1.86
Bicycle LOS	B	B

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	MM
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star
From/To	Connector to Wood
Jurisdiction	
Analysis Year	2020 (No-Build)
Description	Bright Star DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	2	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	425	veh/h
Opposing direction volume, Vo	355	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.996		0.994	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	485	pc/h	406	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	2.7	mi/h
Average travel speed, ATSd	33.7	mi/h
Percent Free Flow Speed, PFFS	77.8	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	483	pc/h	403	pc/h
Base percent time-spent-following,(note-4) BPTSFd	48.1	%		
Adjustment for no-passing zones, fnp	41.9			
Percent time-spent-following, PTSFd	70.9	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	36	veh-mi
Peak-hour vehicle-miles of travel, VMT60	128	veh-mi
Peak 15-min total travel time, TT15	1.1	veh-h
Capacity from ATS, CdATS	1690	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1690	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	33.7	mi/h
Percent time-spent-following, PTSFd (from above)	70.9	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	483.0
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	2.49
Bicycle LOS	B

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

2020 Build Conditions: AM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/21/2016
Analysis Time Period	
Highway	Bright Star Road
From/To	Wood Road/SR 8
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	9	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd	404	veh/h
Opposing direction volume, Vo	258	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.982		0.965	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	468	pc/h	304	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	3.3	mi/h
Average travel speed, ATSd	25.7	mi/h
Percent Free Flow Speed, PFFS	73.4	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.991
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	459 pc/h	296 pc/h
Base percent time-spent-following,(note-4) BPTSFd	45.4 %	
Adjustment for no-passing zones, fnp	43.7	
Percent time-spent-following, PTSFd	72.0 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.28	
Peak 15-min vehicle-miles of travel, VMT15	57	veh-mi
Peak-hour vehicle-miles of travel, VMT60	202	veh-mi
Peak 15-min total travel time, TT15	2.2	veh-h
Capacity from ATS, CdATS	1641	veh/h
Capacity from PTSF, CdPTSF	1685	veh/h
Directional Capacity	1641	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	25.7	mi/h
Percent time-spent-following, PTSFd (from above)	72.0	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	40
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	459.1
Effective width of outside lane, We	24.00
Effective speed factor, St	4.17
Bicycle LOS Score, BLOS	4.18
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 8
From/To	Bright Star Road to SR 5
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	9	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd 635 veh/h
Opposing direction volume, Vo 562 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.991		0.991	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	728	pc/h	644	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATSd	32.7	mi/h
Percent Free Flow Speed, PFFS	72.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	722	pc/h	639	pc/h
Base percent time-spent-following,(note-4) BPTSFd	64.1	%		
Adjustment for no-passing zones, fnp	29.3			
Percent time-spent-following, PTSFd	79.6	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.43	
Peak 15-min vehicle-miles of travel, VMT15	18	veh-mi
Peak-hour vehicle-miles of travel, VMT60	64	veh-mi
Peak 15-min total travel time, TT15	0.6	veh-h
Capacity from ATS, CdATS	1685	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1685	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	32.7	mi/h
Percent time-spent-following, PTSFd (from above)	79.6	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	721.6
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.88
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley Road
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	8	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd	410	veh/h
Opposing direction volume, Vo	308	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.984		0.977	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	473	pc/h	358	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	3.0	mi/h
Average travel speed, ATSd	29.8	mi/h
Percent Free Flow Speed, PFFS	76.0	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.1
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	0.992
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	466 pc/h	353 pc/h
Base percent time-spent-following,(note-4) BPTSFd	46.5 %	
Adjustment for no-passing zones, fnp	42.4	
Percent time-spent-following, PTSFd	70.6 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.28	
Peak 15-min vehicle-miles of travel, VMT15	47	veh-mi
Peak-hour vehicle-miles of travel, VMT60	164	veh-mi
Peak 15-min total travel time, TT15	1.6	veh-h
Capacity from ATS, CdATS	1661	veh/h
Capacity from PTSF, CdPTSF	1687	veh/h
Directional Capacity	1661	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	29.8	mi/h
Percent time-spent-following, PTSFd (from above)	70.6	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	465.9
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.29
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	SR 5
From/To	Gurley to Rose
Jurisdiction	
Analysis Year	2020 (Build)
Description 16-125 DRI	

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	9	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 448 veh/h
Opposing direction volume, Vo 425 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.2	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.982		0.982	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	518	pc/h	492	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	1.8	mi/h
Average travel speed, ATSd	31.6	mi/h
Percent Free Flow Speed, PFFS	76.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	509 pc/h	483 pc/h
Base percent time-spent-following,(note-4) BPTSFd	52.4 %	
Adjustment for no-passing zones, fnp	38.1	
Percent time-spent-following, PTSFd	71.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	89	veh-mi
Peak-hour vehicle-miles of travel, VMT60	314	veh-mi
Peak 15-min total travel time, TT15	2.8	veh-h
Capacity from ATS, CdATS	1669	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1669	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	31.6	mi/h
Percent time-spent-following, PTSFd (from above)	71.9	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	509.1
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.71
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: JS
Agency/Co: Wilburn Engineering
Date: 12/22/2016
Analysis Period: AM Peak Hour
Highway: Bright Star Connector
From/To: SR 5 to Bright Star Road
Jurisdiction:
Analysis Year: 2020 (Build)
Project ID: 16-125 DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	224	vph	179	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	64		51	
Trucks and buses	7	%	7	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.959		0.959	
Flow rate, vp	132	pcphpl	106	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	132	pcphpl	106	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	2.9	pc/mi/ln	2.4	pc/mi/ln

_____ Bicycle Level of Service _____

Posted speed limit, Sp		55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	127.3	101.7
Effective width of outside lane, We	24.00	24.00
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	3.27	3.16
Bicycle LOS	C	C

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	AM Peak Hour
Highway	Bright Star Road
From/To	Bright Star Connector to Wood
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	9	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	339	veh/h
Opposing direction volume, Vo	290	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.3		1.4	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.974		0.965	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	396	pc/h	341	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	3.1	mi/h
Average travel speed, ATSd	34.4	mi/h
Percent Free Flow Speed, PFFS	79.6	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	0.991		0.991	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	389	pc/h	333	pc/h
Base percent time-spent-following,(note-4) BPTSFd	40.4	%		
Adjustment for no-passing zones, fnp	49.0			
Percent time-spent-following, PTSFd	66.8	%		

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.23	
Peak 15-min vehicle-miles of travel, VMT15	29	veh-mi
Peak-hour vehicle-miles of travel, VMT60	102	veh-mi
Peak 15-min total travel time, TT15	0.8	veh-h
Capacity from ATS, CdATS	1641	veh/h
Capacity from PTSF, CdPTSF	1685	veh/h
Directional Capacity	1641	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	34.4	mi/h
Percent time-spent-following, PTSFd (from above)	66.8	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	385.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.56
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

2020 Build Conditions: PM Peak Hour

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/21/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star Road
From/To	Wood Road/SR 8
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.5	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	40	/mi

Analysis direction volume, Vd	437	veh/h
Opposing direction volume, Vo	416	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.2		1.2	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.990		0.990	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	502	pc/h	478	pc/h

Free-Flow Speed from Field Measurement:		
Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	10.0	mi/h
Free-flow speed, FFSd	35.0	mi/h
Adjustment for no-passing zones, fnp	2.3	mi/h
Average travel speed, ATSd	25.0	mi/h
Percent Free Flow Speed, PFFS	71.6	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	497 pc/h	473 pc/h
Base percent time-spent-following,(note-4) BPTSFd	50.9 %	
Adjustment for no-passing zones, fnp	41.0	
Percent time-spent-following, PTSFd	71.9 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.30	
Peak 15-min vehicle-miles of travel, VMT15	62	veh-mi
Peak-hour vehicle-miles of travel, VMT60	219	veh-mi
Peak 15-min total travel time, TT15	2.5	veh-h
Capacity from ATS, CdATS	1683	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1683	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.5	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	25.0	mi/h
Percent time-spent-following, PTSFd (from above)	71.9	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	40
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	496.6
Effective width of outside lane, We	24.00
Effective speed factor, St	4.17
Bicycle LOS Score, BLOS	3.03
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 8
From/To	Bright Star Road to SR 5
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	8	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.1	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	0	/mi

Analysis direction volume, Vd	823	veh/h
Opposing direction volume, Vo	640	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.1	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	1.000		0.992	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	935	pc/h	733	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	0.0	mi/h
Free-flow speed, FFSd	45.0	mi/h
Adjustment for no-passing zones, fnp	1.4	mi/h
Average travel speed, ATSd	30.7	mi/h
Percent Free Flow Speed, PFFS	68.1	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	935	pc/h	727	pc/h
Base percent time-spent-following,(note-4) BPTSFd	74.0	%		
Adjustment for no-passing zones, fnp	23.5			
Percent time-spent-following, PTSFd	87.2	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.55	
Peak 15-min vehicle-miles of travel, VMT15	23	veh-mi
Peak-hour vehicle-miles of travel, VMT60	82	veh-mi
Peak 15-min total travel time, TT15	0.8	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.1	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	30.7	mi/h
Percent time-spent-following, PTSFd (from above)	87.2	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	935.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.64
Bicycle LOS	E

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	SR 8 to Gurley Road
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	7	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.4	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	23	/mi

Analysis direction volume, Vd	499	veh/h
Opposing direction volume, Vo	366	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.993		0.979	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	571	pc/h	425	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	5.8	mi/h
Free-flow speed, FFSd	39.3	mi/h
Adjustment for no-passing zones, fnp	2.6	mi/h
Average travel speed, ATSd	28.9	mi/h
Percent Free Flow Speed, PFFS	73.7	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	567 pc/h	416 pc/h
Base percent time-spent-following,(note-4) BPTSFd	54.2 %	
Adjustment for no-passing zones, fnp	38.0	
Percent time-spent-following, PTSFd	76.1 %	

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.34	
Peak 15-min vehicle-miles of travel, VMT15	57	veh-mi
Peak-hour vehicle-miles of travel, VMT60	200	veh-mi
Peak 15-min total travel time, TT15	2.0	veh-h
Capacity from ATS, CdATS	1664	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1664	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.4	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	28.9	mi/h
Percent time-spent-following, PTSFd (from above)	76.1	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	567.0
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	4.03
Bicycle LOS	D

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineering
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	SR 5
From/To	Gurley to Rose
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	4	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.7	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	66	%
Up/down	-	%	Access point density	15	/mi

Analysis direction volume, Vd 669 veh/h
Opposing direction volume, Vo 446 veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.2	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.996		0.992	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	763	pc/h	511	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	3.8	mi/h
Free-flow speed, FFSd	41.3	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATSd	29.6	mi/h
Percent Free Flow Speed, PFFS	71.8	%

Percent Time-Spent-Following

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.0		1.0	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adjustment factor, fHV	1.000		1.000	
Grade adjustment factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	760	pc/h	507	pc/h
Base percent time-spent-following,(note-4) BPTSFd	65.4	%		
Adjustment for no-passing zones, fnp	28.6			
Percent time-spent-following, PTSFd	82.6	%		

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.45	
Peak 15-min vehicle-miles of travel, VMT15	133	veh-mi
Peak-hour vehicle-miles of travel, VMT60	468	veh-mi
Peak 15-min total travel time, TT15	4.5	veh-h
Capacity from ATS, CdATS	1686	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1686	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.7	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	29.6	mi/h
Percent time-spent-following, PTSFd (from above)	82.6	
Level of service, LOSd (from above)	D	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	760.2
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.24
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
2. If vi (vd or vo) >= 1,700 pc/h, terminate analysis-the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only.
5. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Phone: Fax:
E-mail:

OPERATIONAL ANALYSIS

Analyst: JS
Agency/Co: Wilburn Engineering
Date: 12/22/2016
Analysis Period: PM Peak Hour
Highway: Bright Star Connector
From/To: SR 5 to Bright Star Road
Jurisdiction:
Analysis Year: 2020 (Build)
Project ID: 16-125 DRI

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	45.0	mph	45.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	45.0	mph	45.0	mph

VOLUME

Direction	1		2	
Volume, V	305	vph	259	vph
Peak-hour factor, PHF	0.88		0.88	
Peak 15-minute volume, v15	87		74	
Trucks and buses	3	%	3	%
Recreational vehicles	4	%	4	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.978		0.978	
Flow rate, vp	177	pcphpl	150	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	177	pcphpl	150	pcphpl
Free-flow speed, FFS	45.0	mph	45.0	mph
Avg. passenger-car travel speed, S	45.0	mph	45.0	mph
Level of service, LOS	A		A	
Density, D	3.9	pc/mi/ln	3.3	pc/mi/ln

_____ Bicycle Level of Service _____

Posted speed limit, Sp		55
Percent of segment with occupied on-highway parking	0	0
Pavement rating, P	3	3
Flow rate in outside lane, vOL	173.3	147.2
Effective width of outside lane, We	24.00	24.00
Effective speed factor, St	4.79	4.79
Bicycle LOS Score, BLOS	2.22	2.14
Bicycle LOS	B	B

Overall results are not computed when free-flow speed is less than 45 mph.

Phone: Fax:
E-Mail:

Directional Two-Lane Highway Segment Analysis

Analyst	JS
Agency/Co.	Wilburn Engineerin
Date Performed	12/22/2016
Analysis Time Period	PM Peak Hour
Highway	Bright Star Road
From/To	Bright Star Connector to Wood
Jurisdiction	
Analysis Year	2020 (Build)
Description	16-125 DRI

Input Data

Highway class	Class 3		Peak hour factor, PHF	0.88	
Shoulder width	6.0	ft	% Trucks and buses	5	%
Lane width	12.0	ft	% Trucks crawling	0.0	%
Segment length	0.3	mi	Truck crawl speed	0.0	mi/hr
Terrain type	Level		% Recreational vehicles	4	%
Grade: Length	-	mi	% No-passing zones	100	%
Up/down	-	%	Access point density	7	/mi

Analysis direction volume, Vd	510	veh/h
Opposing direction volume, Vo	384	veh/h

Average Travel Speed

Direction	Analysis(d)		Opposing (o)	
PCE for trucks, ET	1.1		1.3	
PCE for RVs, ER	1.0		1.0	
Heavy-vehicle adj. factor,(note-5) fHV	0.995		0.985	
Grade adj. factor,(note-1) fg	1.00		1.00	
Directional flow rate,(note-2) vi	582	pc/h	443	pc/h

Free-Flow Speed from Field Measurement:

Field measured speed,(note-3) S FM	-	mi/h
Observed total demand,(note-3) V	-	veh/h

Estimated Free-Flow Speed:

Base free-flow speed,(note-3) BFFS	45.0	mi/h
Adj. for lane and shoulder width,(note-3) fLS	0.0	mi/h
Adj. for access point density,(note-3) fA	1.8	mi/h
Free-flow speed, FFSd	43.3	mi/h
Adjustment for no-passing zones, fnp	2.5	mi/h
Average travel speed, ATSd	32.8	mi/h
Percent Free Flow Speed, PFFS	75.8	%

Percent Time-Spent-Following

Direction	Analysis(d)	Opposing (o)
PCE for trucks, ET	1.0	1.0
PCE for RVs, ER	1.0	1.0
Heavy-vehicle adjustment factor, fHV	1.000	1.000
Grade adjustment factor,(note-1) fg	1.00	1.00
Directional flow rate,(note-2) vi	580 pc/h	436 pc/h
Base percent time-spent-following,(note-4) BPTSFd	55.1 %	
Adjustment for no-passing zones, fnp	37.4	
Percent time-spent-following, PTSFd	76.5 %	

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.34	
Peak 15-min vehicle-miles of travel, VMT15	43	veh-mi
Peak-hour vehicle-miles of travel, VMT60	153	veh-mi
Peak 15-min total travel time, TT15	1.3	veh-h
Capacity from ATS, CdATS	1675	veh/h
Capacity from PTSF, CdPTSF	1700	veh/h
Directional Capacity	1675	veh/h

Passing Lane Analysis

Total length of analysis segment, Lt	0.3	mi
Length of two-lane highway upstream of the passing lane, Lu	-	mi
Length of passing lane including tapers, Lpl	-	mi
Average travel speed, ATSd (from above)	32.8	mi/h
Percent time-spent-following, PTSFd (from above)	76.5	
Level of service, LOSd (from above)	C	

Average Travel Speed with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for average travel speed, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for average travel speed, Ld	-	mi
Adj. factor for the effect of passing lane on average speed, fpl	-	
Average travel speed including passing lane, ATSpl	-	
Percent free flow speed including passing lane, PFFSpl	0.0	%

Percent Time-Spent-Following with Passing Lane

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, Lde	-	mi
Length of two-lane highway downstream of effective length of the passing lane for percent time-spent-following, Ld	-	mi
Adj. factor for the effect of passing lane on percent time-spent-following, fpl	-	
Percent time-spent-following including passing lane, PTSFpl	-	%

Level of Service and Other Performance Measures with Passing Lane

Level of service including passing lane, LOSpl	E	
Peak 15-min total travel time, TT15	-	veh-h

Bicycle Level of Service

Posted speed limit, Sp	55
Percent of segment with occupied on-highway parking	0
Pavement rating, P	3
Flow rate in outside lane, vOL	579.5
Effective width of outside lane, We	24.00
Effective speed factor, St	4.79
Bicycle LOS Score, BLOS	3.40
Bicycle LOS	C

Notes:
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific dewngrade segments are treated as level terrain.
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