

Attachment B
Transportation Impact Analysis Update

TRAFFIC IMPACT STUDY FOR MAGEE RANCH IN THE TOWN OF DANVILLE

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May 7, 2019

WEEKDAY BICYCLE LEVEL OF SERVICE – EXISTING CONDITIONS

Analysis was conducted to determine the existing weekday level of service for bicycles on Diablo Road/Blackhawk Road between McCauley Road/Green Valley Road and Magee Ranch Road/Hidden Oak Drive. Summarized in **Table 6**, the BLOS results for Existing Conditions show acceptable levels of operation on most segments during all peak hours, except between Avenida Nueva and Diablo Creek Place in both directions during all weekday peak hours.

The deficient segment is highly impacted by the number of right-turn vehicular access points created by numerous residential driveways. The number of access points is not easily adjusted, as residents must retain access to Diablo Road/Blackhawk Road, and the best opportunity for improving bicyclist comfort and safety would be either extensive physical alteration of the existing roadway cross-section (which would require right-of-way acquisition for widening), or development of an alternate, parallel path.

Table 6: Weekday Peak Hour Segment BLOS – Existing Conditions

Roadway	From	To	Direction	AM Peak		School PM Peak		PM Peak	
				BLOS Score	BLOS	BLOS Score	BLOS	BLOS Score	BLOS
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.75	D	3.77	D	3.73	D
			WB	4.00	D	3.96	D	3.94	D
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.36	C	3.38	C	3.33	C
			WB	3.29	C	3.28	C	3.27	C
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.59	D	3.61	D	3.57	D
			WB	3.69	D	3.68	D	3.68	D
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.66	E	4.67	E	4.64	E
			WB	4.82	E	4.81	E	4.81	E
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.77	D	3.81	D	3.78	D
			WB	3.41	C	3.40	C	3.40	C

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound
Bold indicates unacceptable operations.

¹ Analysis performed prior to installation of bicycle lanes along study segment, however BLOS will not deteriorate with new bicycle facilities.

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WEEKDAY BICYCLE LEVEL OF SERVICE – EXISTING PLUS PROJECT CONDITIONS

Table 11 summarizes weekday BLOS analysis results under Existing plus Project Conditions. With the Project, the Diablo Road/Blackhawk Road corridor is expected to continue operating at acceptable BLOS D or better on most segments during all peak hours, except between Avenida Nueva and Diablo Creek Place in both directions during all weekday peak hours (as under Existing Conditions).

As noted under Existing Conditions, the deficient segment is mainly impacted by the right-turn access-point density generated by existing residential driveways, which is a critical variable in BLOS calculation using HCM 2010 methodology. Consistent with enhancing bicyclist comfort and safety in the vicinity, the Project will provide a trail system parallel to the deficient segment available to the bicyclist community that could improve bicyclist comfort through this segment of the study corridor.

Table 11: Weekday Peak Hour Segment BLOS – Existing plus Project Conditions

Roadway	From	To	Direction	AM Peak			School PM Peak			PM Peak		
				BLOS Score	BLOS	%Diff.	BLOS Score	BLOS	%Diff.	BLOS Score	BLOS	%Diff.
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.75	D	0.00%	3.77	D	0.00%	3.73	D	0.00%
			WB	4.03	D	0.75%	3.97	D	0.25%	3.95	D	0.25%
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.37	C	0.30%	3.38	C	0.00%	3.34	C	0.30%
			WB	3.30	C	0.30%	3.28	C	0.00%	3.28	C	0.31%
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.59	D	0.00%	3.62	D	0.28%	3.57	D	0.00%
			WB	3.70	D	0.27%	3.68	D	0.00%	3.68	D	0.00%
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.66	E	0.00%	4.68	E	0.21%	4.64	E	0.00%
			WB	4.83	E	0.21%	4.82	E	0.21%	4.81	E	0.00%
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.77	D	0.00%	3.81	D	0.00%	3.78	D	0.00%
			WB	3.41	C	0.00%	3.40	C	0.00%	3.40	C	0.00%

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound

Bold indicates unacceptable operations.

Underline indicates one LOS letter-grade deterioration from “no Project” to “plus Project” Conditions.

%Diff. represents difference in BLOS Score between “no Project” and “plus Project” Conditions.

¹ Analysis performed prior to installation of bicycle lanes along study segment, however BLOS will not deteriorate with new bicycle facilities.



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WEEKDAY BICYCLE LEVEL OF SERVICE – CUMULATIVE CONDITIONS

Table 14 summarizes weekday BLOS analysis results under Cumulative Conditions. Considering anticipated traffic growth, the Diablo Road/Blackhawk Road corridor is expected to operate at acceptable BLOS D or better on most segments during all peak hours, except between Avenida Nueva and Diablo Creek Place in both directions during all peak hours.

As under Existing Conditions, the deficient segment is mainly impacted by the number of right-turn vehicular access points created by numerous residential driveways. The number of access points is not easily adjusted, as residents must retain access to Diablo Road/Blackhawk Road, and the best opportunity for improving bicyclist comfort and safety would be either extensive physical alteration of the existing roadway cross-section (which would require right-of-way acquisition for widening), or development of an alternate, parallel path.

Table 14: Weekday Peak Hour Segment BLOS – Cumulative Conditions

Roadway	From	To	Direction	AM Peak		School PM Peak		PM Peak	
				BLOS Score	BLOS	BLOS Score	BLOS	BLOS Score	BLOS
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.76	D	3.77	D	3.73	D
			WB	4.03	D	3.99	D	3.97	D
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.37	C	3.38	C	3.34	C
			WB	3.30	C	3.28	C	3.28	C
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.60	D	3.62	D	3.58	D
			WB	3.70	D	3.69	D	3.68	D
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.66	E	4.68	E	4.64	E
			WB	4.83	E	4.82	E	4.81	E
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.78	D	3.82	D	3.79	D
			WB	3.42	C	3.40	C	3.45	C

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound
Bold indicates unacceptable operations.

¹ Analysis performed prior to installation of bicycle lanes along study segment, however BLOS will not deteriorate with new bicycle facilities.

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WEEKDAY BICYCLE LEVEL OF SERVICE – CUMULATIVE PLUS PROJECT CONDITIONS

Table 17 summarizes weekday BLOS analysis results under Cumulative plus Project Conditions. With the Project, the Diablo Road/ Blackhawk Road corridor is expected to continue operating at acceptable BLOS D or better on most segments during all peak hours, except between Avenida Nueva and Diablo Creek Place in both directions during all weekday peak hours.

As noted under Cumulative Conditions, the deficient segment is mainly impacted by the right-turn access-point density generated by existing residential driveways. Consistent with enhancing bicyclist comfort and safety in the vicinity, the Project will provide a trail system parallel to the deficient segment available to the bicyclist community that could improve bicyclist comfort through this segment of the study corridor.

Table 17: Weekday Peak Hour Segment BLOS – Cumulative plus Project Conditions

Roadway	From	To	Direction	AM Peak			School PM Peak			PM Peak		
				BLOS Score	BLOS	%Diff.	BLOS Score	BLOS	%Diff.	BLOS Score	BLOS	%Diff.
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.76	D	0.00%	3.77	D	0.00%	3.73	D	0.00%
			WB	4.06	D	0.74%	4.00	D	0.25%	3.98	D	0.25%
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.37	C	0.00%	3.38	C	0.00%	3.34	C	0.00%
			WB	3.30	C	0.00%	3.29	C	0.30%	3.28	C	0.00%
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.60	D	0.00%	3.62	D	0.00%	3.58	D	0.00%
			WB	3.71	D	0.27%	3.69	D	0.00%	3.69	D	0.27%
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.66	E	0.00%	4.68	E	0.00%	4.65	E	0.22%
			WB	4.83	E	0.00%	4.82	E	0.00%	4.82	E	0.21%
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.78	D	0.00%	3.82	D	0.00%	3.79	D	0.00%
			WB	3.42	C	0.00%	3.41	C	0.29%	3.45	C	0.00%

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound

Bold indicates unacceptable operations.

Underline indicates one LOS letter-grade deterioration from “no Project” to “plus Project” Conditions.

%Diff. represents difference in BLOS Score between “no Project” and “plus Project” Conditions.

¹ Analysis performed prior to installation of bicycle lanes along study segment, however BLOS will not deteriorate with new bicycle facilities.

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Table 19: Weekend Peak Hour Segment BLOS – Existing and Existing plus Project Conditions

Roadway	From	To	Direction	Existing Conditions		Existing plus Project Conditions		%Diff.
				BLOS Score	BLOS	BLOS Score	BLOS	
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.71	D	3.71	D	0.00%
			WB	3.83	D	3.83	D	0.00%
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.31	C	3.31	C	0.00%
			WB	3.23	C	3.24	C	0.31%
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.55	D	3.55	D	0.00%
			WB	3.64	D	3.64	D	0.00%
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.62	E	4.62	E	0.00%
			WB	4.77	E	4.77	E	0.00%
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.75	D	3.75	D	0.00%
			WB	3.37	C	3.38	C	0.30%

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound

Bold indicates unacceptable operations.

%Diff. represents difference in BLOS Score between “no Project” and “plus Project” Conditions.

¹ Analysis performed prior to installation of bicycle lanes along study segment, however BLOS will not deteriorate with new bicycle facilities.

Table 20: Weekend Peak Hour Segment BLOS – Cumulative and Cumulative plus Project Conditions

Roadway	From	To	Direction	Cumulative Conditions		Cumulative plus Project Conditions		%Diff.
				BLOS Score	BLOS	BLOS Score	BLOS	
Diablo Rd	McCauley Rd/ Green Valley Rd	Calle Arroyo	EB	3.71	D	3.71	D	0.00%
			WB	3.84	D	3.85	D	0.26%
Diablo Rd	Calle Arroyo	Alameda Diablo	EB	3.32	C	3.32	C	0.00%
			WB	3.24	C	3.24	C	0.00%
Diablo Rd	Alameda Diablo	Avenida Nueva	EB	3.56	D	3.56	D	0.00%
			WB	3.64	D	3.64	D	0.00%
Diablo Rd/ Blackhawk Rd	Avenida Nueva	Diablo Creek Pl	EB	4.62	E	4.62	E	0.00%
			WB	4.77	E	4.78	E	0.21%
Blackhawk Rd ¹	Diablo Creek Pl	Magee Ranch Rd/ Hidden Oak Dr	EB	3.75	D	3.75	D	0.00%
			WB	3.38	C	3.38	C	0.00%

Notes: BLOS = Bicycle Level of Service; EB = Eastbound; WB = Westbound

Bold indicates unacceptable operations.

%Diff. represents difference in BLOS Score between “no Project” and “plus Project” Conditions.

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Step #	Variable	Equation/Definition	Existing Conditions																														
			AM Peak Hour										School PM Peak Hour										PM Peak Hour										
			Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		
			EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	
1	Sb	Bicycle Speed (measured or assumed 15 mph)	10	15	10	15	5	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15			
2	db	db = 0.0	0.00	115.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
		db = (0.5C(1-gb/C)^2)/(1-(1*gb/C))																															
	C	Cycle Length	-	186	-	-	-	-	-	-	-	-	127	-	-	-	-	-	-	-	-	-	-	-	186	-	-	-	-	-			
	gb	gb=Dp-1-I2	-	45	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-	-	-			
	Dp	Phase Duration	-	49	-	-	-	-	-	-	-	-	39	-	-	-	-	-	-	-	-	-	-	-	49	-	-	-	-	-			
	l1	Loss time = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-			
	l2	l2 = Y+Rc-e	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-			
	Y	Yellow Interval	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-			
Rc	Red Clearance	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-				
e	Extension of Effective Green = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-				
3	STb,seg	STb,seg = (3600*L)/(5280*(trb+db))	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.23	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00			
	tRb	tRb = (3600*L)/(5280Sb)	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	
	L	Length (feet)	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	
4	lb,int	lb,int = 4.1324+Fw+Fv	2.82	3.37	1.64	1.41	3.27	2.77	2.87	2.45	2.36	1.86	3.15	3.29	1.96	1.31	3.52	2.66	3.10	2.42	2.71	1.68	2.72	3.25	1.54	1.28	3.10	2.65	2.70	2.37	2.38	1.76	
	Fw	Fw = 0.0153*Wcd-0.2144Wt	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	
	Wcd	Curb-to-Curb width of Cross Street	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	22	70	22	22	50	22	22	70	22	70	22	22	
	Wt	Wt = Wol+Wbl+lpk*Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	
	Wol	Outside Lane Width	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	
	Wbl	Bike Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	lpk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Wos	Shoulder Width (no curb)	1	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3
	Fv	Fv = .0066*(vlt+vth+vrt)/(4*Nth)	0.93	1.26	0.88	1.23	0.83	1.09	0.86	1.01	0.65	0.93	1.26	1.18	1.20	1.13	1.08	0.98	1.09	0.98	1.00	0.75	0.83	1.14	0.78	1.10	0.66	0.97	0.69	0.93	0.67	0.83	
	vlt	Left-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	vth	Through Demand Flow Rate	563	765	533	744	503	658	524	610	396	563	765	718	730	686	654	593	658	595	607	455	505	692	471	669	402	589	419	566	408	500	
	vrt	Right-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	lb,link	lb,link = .760+Fw+Fv+Fs+fp	4.00	3.97	3.20	2.77	3.77	3.84	3.49	3.68	3.09	3.22	4.10	3.86	3.29	2.67	3.89	3.75	3.59	3.62	3.34	3.13	3.85	3.84	3.02	2.65	3.63	3.74	3.39	3.57	3.16	3.16	
	Fw	Fw = -.005*We^2	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	
	We	We = Wv = Wt = Wol+Wbl+Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	
	ppk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Fv	Fv = .507*ln(vma/(4Nth))	2.67	2.78	2.65	2.73	2.55	2.65	2.55	2.63	2.38	2.54	2.78	2.67	2.75	2.63	2.68	2.56	2.66	2.57	2.63	2.45	2.53	2.65	2.48	2.61	2.42	2.55	2.46	2.52	2.45	2.48	
vma	vma = vm	782	956	740	875	613	748	609	709	440	605	968	772	901	715	798	624	765	640	723	506	587	752	529	690	473	614	511	578	498	532		
vm	vm = V/PHF	782	956	740	875	613	748	609	709	440	605	968	772	901	715	798	624	765	640	723	506	587	752	529	690	473	614	511	578	498	532		
PHF	Peak Hour Factor	0.72	0.8	0.72	0.85	0.82	0.88	0.86	0.86	0.9	0.93	0.79	0.93	0.81	0.96	0.82	0.95	0.86	0.93	0.84	0.9	0.86	0.92	0.89	0.97	0.85	0.96	0.82	0.98	0.82	0.94		
Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Fs	Fs = .199*[1.1199ln(SRa-20)+.8103](1+.1038*PHVa)^2	0.85	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84		
SRa	SRa = SR	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40		
SR	SR = Vehicle Speed	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40		
PHVa	PHV	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.06	0.071	0.06	0.071	0.06	0.071	0.06	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056	0.065	0.056	0.038	0.062		
PHVa	Percent Heavy Vehicle (<50%)	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.060	0.071	0.060	0.071	0.060	0.071	0.060	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056	0.065	0.056	0.038	0.062		
Fp	Fp = 7.066/Pc^2	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44			
Pc	Pavement Condition Rating	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
6	LOSlink	Link LOS	D	D	C	C	D	D	C	D	C	C	D	D	C	B	D	D	D	D	C	C	D	D	C	B	D	D	C	D	C		
7	lb,seg	lb,seg = .160*lb,link+.011*Fbi*e^lb,int+.035*(Nap,s/(L/5280))+2.85	3.75	4.00	3.36	3.29	3.59	3.69	4.66	4.82	3.77	3.41	3.77	3.96	3.38	3.28	3.61	3.68	4.67	4.81	3.81	3.40	3.73	3.94	3.33	3.27	3.57	3.68	4.64	4.81	3.78	3.40	
	Fbi	Fbi = 0.0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
		Fbi = 1.0																															
	Nap,s	# Access Points on right side (direction of travel)	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	
8	LOSseg	Segment LOS	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	E	E	D	C	D	D	C</								

Step #	Variable	Equation/Definition	Existing plus Project Conditions																													
			AM Peak Hour										School PM Peak Hour										PM Peak Hour									
			Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5	
			EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
1	Sb	Bicycle Speed (measured or assumed 15 mph)	10	15	10	15	5	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15		
2	db	db = 0.0	0.00	115.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
		db = (0.5C(1-gb/C)^2)/(1-(1*gb/C))																														
	C	Cycle Length	-	186	-	-	-	-	-	-	-	-	127	-	-	-	-	-	-	-	-	-	-	-	-	186	-	-	-	-		
	gb	gb=Dp-1-I2	-	45	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-	-		
	Dp	Phase Duration	-	49	-	-	-	-	-	-	-	-	39	-	-	-	-	-	-	-	-	-	-	-	-	49	-	-	-	-		
	I1	Loss time = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-		
	I2	I2 = Y+Rc-e	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-		
	Y	Yellow Interval	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-		
Rc	Red Clearance	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-			
e	Extension of Effective Green = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-			
3	STb,seg	STb,seg = (3600*L)/(5280*(trb+db))	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.23	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00		
	tRb	tRb = (3600*L)/(5280Sb)	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95
4	L	Length (feet)	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915
	lb,int	lb,int = 4.1324+Fw+Fv	2.85	3.44	1.67	1.47	3.30	2.83	2.91	2.51	2.40	1.88	3.20	3.33	2.02	1.34	3.57	2.69	3.15	2.45	2.73	1.71	2.77	3.28	1.58	1.31	3.15	2.68	2.75	2.40	2.40	1.78
	Fw	Fw = 0.0153*Wcd-0.2144Wt	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20
	Wcd	Curb-to-Curb width of Cross Street	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	22	70	22	22	50	22	22	70	22	70	22	22
	Wt	Wt = Wol+Wbl+lpk*Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5
	Wol	Outside Lane Width	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2
	Wbl	Bike Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	lpk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Wos	Shoulder Width (no curb)	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3
	Fv	Fv = .0066*(vlt+vth+vrt)/(4*Nth)	0.96	1.33	0.91	1.29	0.86	1.15	0.90	1.07	0.69	0.95	1.31	1.22	1.26	1.16	1.13	1.01	1.14	1.01	1.02	0.78	0.88	1.17	0.82	1.13	0.71	1.00	0.74	0.96	0.69	0.85
	vlt	Left-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	vth	Through Demand Flow Rate	584	805	554	784	524	698	545	650	419	574	796	738	761	706	685	613	689	615	620	474	533	708	499	685	430	605	447	582	417	515
	vrt	Right-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	lb,link	lb,link = .760+Fw+Fv+Fs+fp	4.02	3.99	3.22	2.80	3.79	3.87	3.51	3.71	3.12	3.23	4.12	3.87	3.31	2.68	3.92	3.77	3.62	3.64	3.36	3.15	3.88	3.86	3.05	2.66	3.66	3.76	3.42	3.59	3.17	3.17
	Fw	Fw = -.005*We^2	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36
	We	We = Wv = Wt = Wol+Wbl+Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5
	ppk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fv	Fv = .507*ln(vma/(4Nth))	2.69	2.80	2.67	2.76	2.57	2.68	2.57	2.66	2.41	2.55	2.80	2.68	2.77	2.64	2.71	2.58	2.69	2.59	2.65	2.47	2.56	2.67	2.51	2.62	2.45	2.57	2.49	2.54	2.46	2.49
	vma	vma = vm	811	1006	769	922	639	793	634	756	466	617	1008	794	940	735	835	645	801	661	738	527	620	770	561	706	506	630	545	594	509	548
	vm	vm = V/PHF	811	1006	769	922	639	793	634	756	466	617	1008	794	940	735	835	645	801	661	738	527	620	770	561	706	506	630	545	594	509	548
	PHF	Peak Hour Factor	0.72	0.8	0.72	0.85	0.82	0.88	0.86	0.86	0.9	0.93	0.79	0.93	0.81	0.96	0.82	0.95	0.86	0.93	0.84	0.9	0.86	0.92	0.89	0.97	0.85	0.96	0.82	0.98	0.82	0.94
Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fs	Fs = .199*[1.1199ln(SRa-20)+.8103](1+.1038*PHVa)^2	0.85	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
SRa	SRa = SR	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
SR	SR = Vehicle Speed	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
PHVa	PHV	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.06	0.071	0.06	0.071	0.06	0.071	0.06	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056	0.065	0.056	0.038	0.062	
PHVa	Percent Heavy Vehicle (<50%)	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.060	0.071	0.060	0.071	0.060	0.071	0.060	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056	0.065	0.056	0.038	0.062	
Fp	Fp = 7.066/Pc^2	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44		
Pc	Pavement Condition Rating	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
6	LOSlink	Link LOS	D	D	C	C	D	D	C	D	C	C	D	D	C	B	D	D	D	D	C	C	D	D	C	B	D	D	C	D	C	
7	lb,seg	lb,seg = .160*lb,link+.011*Fbi*e^lb,int+.035*(Nap,s/(L/5280))+2.85	3.75	4.03	3.37	3.30	3.59	3.70	4.66	4.83	3.77	3.41	3.77	3.97	3.38	3.28	3.62	3.68	4.68	4.82	3.81	3.40	3.73	3.95	3.34	3.28	3.57	3.68	4.64	4.81	3.78	3.40
	Fbi	Fbi = 0.0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fbi = 1.0																															
	Nap,s	# Access Points on right side (direction of travel)	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1
8	LOSseg	Segment LOS	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	E	E	D	C	D									

Step #	Variable	Equation/Definition	Cumulative Conditions																														
			AM Peak Hour										School PM Peak Hour										PM Peak Hour										
			Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		
			EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	
1	Sb	Bicycle Speed (measured or assumed 15 mph)	10	15	10	15	5	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15			
2	db	db = 0.0 db = (0.5C(1-gb/C)^2)/(1-(1*gb/C))	0.00	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
	C	Cycle Length	-	135	-	-	-	-	-	-	-	-	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	gb	gb=Dp-1-I2	-	19	-	-	-	-	-	-	-	-	19.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Dp	Phase Duration	-	23	-	-	-	-	-	-	-	-	23.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	I1	Loss time = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	I2	I2 = Y+Rc-e	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Y	Yellow Interval	-	3	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Rc	Red Clearance	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
e	Extension of Effective Green = 2	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
3	STb,seg	STb,seg = (3600*L)/(5280*(trb+db))	10.00	9.41	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.62	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.64	10.00	15.00	5.00	15.00	10.00	15.00			
	tRb	tRb = (3600*L)/(5280Sb)	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	
	L	Length (feet)	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	
4	lb,int	lb,int = 4.1324+Fw+Fv	2.90	3.46	1.70	1.50	3.33	2.84	2.94	2.52	2.41	1.93	3.24	3.38	2.05	1.39	3.60	2.73	3.17	2.49	2.78	1.74	2.78	3.33	1.59	1.36	3.15	2.72	2.75	2.44	2.43	2.35	
	Fw	Fw = 0.0153*Wcd-0.2144Wt	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	
	Wcd	Curb-to-Curb width of Cross Street	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	22	22	50	22	22	70	22	70	22	70	22	22	
	Wt	Wt = Wol+Wbl+Ipk*Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	
	Wol	Outside Lane Width	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	
	Wbl	Bike Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Ipk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Wos	Shoulder Width (no curb)	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	
	Fv	Fv = .0066*(vlt+vth+vrt)/(4*Nth)	1.01	1.35	0.94	1.32	0.89	1.16	0.93	1.08	0.70	1.00	1.35	1.27	1.29	1.21	1.16	1.05	1.16	1.05	1.07	0.81	0.89	1.22	0.83	1.18	0.71	1.04	0.74	1.00	0.72	1.42	
	vlt	Left-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	vth	Through Demand Flow Rate	613	819	572	798	539	705	562	654	425	604	820	770	783	735	701	636	705	638	651	488	542	742	505	717	431	632	449	607	438	858	
	vrt	Right-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	5	lb,link	lb,link = .760+Fw+Fv+Fs+fp	4.05	4.00	3.23	2.81	3.81	3.88	3.52	3.71	3.13	3.26	4.14	3.89	3.32	2.70	3.93	3.79	3.63	3.66	3.38	3.17	3.89	3.88	3.05	2.69	3.67	3.78	3.42	3.61	3.19	3.43
		Fw	Fw = -.005*We^2	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36
We		We = Wv = Wt = Wol+Wbl+Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	
ppk		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fv		Fv = .507*ln(vma/(4Nth))	2.72	2.81	2.68	2.77	2.59	2.69	2.58	2.42	2.58	2.82	2.70	2.78	2.66	2.72	2.60	2.70	2.61	2.67	2.49	2.57	2.69	2.51	2.65	2.46	2.59	2.49	2.56	2.48	2.75		
vma		vma = vm	851	1024	794	939	657	801	653	760	472	649	1038	828	967	766	855	669	820	686	775	542	630	807	567	739	507	658	548	619	534	913	
vm		vm = V/PHF	851	1024	794	939	657	801	653	760	472	649	1038	828	967	766	855	669	820	686	775	542	630	807	567	739	507	658	548	619	534	913	
PHF		Peak Hour Factor	0.72	0.8	0.72	0.85	0.82	0.88	0.86	0.86	0.9	0.93	0.79	0.93	0.81	0.96	0.82	0.95	0.86	0.93	0.84	0.9	0.86	0.92	0.89	0.97	0.85	0.96	0.82	0.98	0.82	0.94	
Nth		Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
FS		FS = .199*[1.1199ln(SRa-20)+.8103](1+.1038*PHVa)^2	0.85	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
SRa		SRa = SR	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
SR		SR = Vehicle Speed	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
PHVa		PHV	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.06	0.071	0.06	0.071	0.06	0.071	0.06	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.06	0.065	0.056	0.038	0.062	
PHVa		Percent Heavy Vehicle (<50%)	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.060	0.071	0.060	0.071	0.060	0.071	0.060	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.06	0.065	0.056	0.038	0.062	
Fp		Fp = 7.066/Pc^2	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44		
Pc	Pavement Condition Rating	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
6	LOSlink	Link LOS	D	D	C	C	D	D	C	D	C	C	D	D	C	B	D	D	D	D	C	C	D	D	C	B	D	D	C	D	C		
7	lb,seg	lb,seg = .160*lb,link+.011*Fbi*e^lb,int+.035*(Nap,s/(L/5280))+2.85	3.76	4.03	3.37	3.30	3.60	3.70	4.66	4.83	3.78	3.42	3.77	3.99	3.38	3.28	3.62	3.69	4.68	4.82	3.82	3.40	3.73	3.97	3.34	3.28	3.58	3.68	4.64	4.81	3.79	3.45	
	Fbi	Fbi = 0.0 Fbi = 1.0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
	Nap,s	# Access Points on right side (direction of travel)	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	
8	LOSseg	Segment LOS	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	E	E	D	C	

Step #	Variable	Equation/Definition	Cumulative plus Project Conditions																										
			AM Peak Hour										School PM Peak Hour										PM Peak Hour						
			Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3	Segment #4	Segment #5
			EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB
1	Sb	Bicycle Speed (measured or assumed 15 mph)	10	15	10	15	5	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	10	15	
2	db	db = 0.0 db = (0.5C(1-gb/C)^2)/(1-(1*gb/C))	0.00	77.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	C	Cycle Length	-	135	-	-	-	-	-	-	-	-	-	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	gb	gb=Dp-1-I2	-	19	-	-	-	-	-	-	-	-	-	19.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Dp	Phase Duration	-	23	-	-	-	-	-	-	-	-	-	23.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	I1	Loss time = 2	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	I2	I2 = Y+Rc-e	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Y	Yellow Interval	-	3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Rc	Red Clearance	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
e	Extension of Effective Green = 2	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3	STb_seg	STb_seg = (3600*L)/(5280*(trb+db))	10.00	9.41	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.62	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	9.64	10.00	15.00	5.00	15.00	
	tRb	tRb = (3600*L)/(5280Sb)	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	
	L	Length (feet)	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	
4	lb,int	lb,int = 4.1324+Fw+Fv	2.94	3.53	1.74	1.56	3.36	2.91	2.97	2.59	2.45	1.94	3.29	3.41	2.10	1.43	3.65	2.76	3.22	2.53	2.81	1.77	2.83	3.36	1.64	1.41	3.20	2.77	
	Fw	Fw = 0.0153*Wcd-0.2144Wt	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-3.20	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	
	Wcd	Curb-to-Curb width of Cross Street	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	22	70	22	22	50	22	22	70	
	Wt	Wt = Wol+Wbl+lpk*Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	
	Wol	Outside Lane Width	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	
	Wbl	Bike Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	lpk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Wos	Shoulder Width (no curb)	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2
	Fv	Fv = .0066*(vlt+vt+vt)/(4*Nth)	1.05	1.42	0.98	1.38	0.92	1.23	0.96	1.15	0.74	1.01	1.40	1.30	1.34	1.25	1.21	1.08	1.21	1.09	1.10	0.84	0.94	1.25	0.88	1.23	0.76	1.09	
	vlt	Left-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	vt	Through Demand Flow Rate	634	859	593	838	560	745	583	694	448	615	851	790	814	755	732	656	736	658	664	507	570	758	533	745	459	660	
	vrt	Right-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	lb,link	lb,link = .760+Fw+Fv+Fs+fp	4.07	4.03	3.25	2.83	3.83	3.91	3.54	3.74	3.16	3.27	4.16	3.91	3.34	2.72	3.95	3.80	3.65	3.67	3.39	3.19	3.91	3.89	3.08	2.71	3.70	3.80	
	Fw	Fw = -.005*We^2	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	
	We	We = Wv = Wt = Wol+Wbl+Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	
	ppk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fv	Fv = .507*ln(vma/(4Nth))	2.74	2.84	2.70	2.79	2.61	2.72	2.60	2.69	2.45	2.59	2.84	2.72	2.80	2.68	2.74	2.61	2.72	2.62	2.68	2.51	2.59	2.70	2.54	2.67	2.49	2.61	
vma	vma = vm	881	1074	824	986	683	847	678	807	498	661	1077	849	1005	786	893	691	856	708	790	563	663	824	599	768	540	688		
vm	vm = V/PHF	881	1074	824	986	683	847	678	807	498	661	1077	849	1005	786	893	691	856	708	790	563	663	824	599	768	540	688		
PHF	Peak Hour Factor	0.72	0.8	0.72	0.85	0.82	0.88	0.86	0.9	0.93	0.79	0.93	0.81	0.96	0.82	0.95	0.86	0.93	0.84	0.9	0.86	0.92	0.89	0.97	0.85	0.96	0.82		
Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Fs	Fs = .199*[1.1199ln(SRa-20)+.8103](1+.1038*PHVa)^2	0.85	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84		
SRa	SRa = SR	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
SR	SR = Vehicle Speed	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
PHVa	PHV	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.06	0.071	0.06	0.071	0.06	0.071	0.06	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056		
PHVa	Percent Heavy Vehicle (<50%)	0.102	0.045	0.102	0.045	0.102	0.045	0.102	0.045	0.075	0.053	0.071	0.060	0.071	0.060	0.071	0.060	0.071	0.060	0.053	0.082	0.065	0.056	0.065	0.056	0.065	0.056		
Fp	Fp = 7.066/Pc^2	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44		
Pc	Pavement Condition Rating	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
6	LOSlink	Link LOS	D	D	C	C	D	D	C	D	C	C	D	D	C	B	D	D	D	D	C	C	D	D	C	B	D	D	
7	lb,seg	lb,seg = .160*lb,link+.011*Fbi*e^lb,int+.035*(Nap,s/(L/5280))+2.85	3.76	4.06	3.37	3.30	3.60	3.71	4.66	4.83	3.78	3.42	3.77	4.00	3.38	3.29	3.62	3.69	4.68	4.82	3.82	3.41	3.73	3.98	3.34	3.28	3.58		
	Fbi	Fbi = 0.0 Fbi = 1.0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0		
	Nap,s	# Access Points on right side (direction of travel)	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	9	10	9	1	4	3	0	0	3	5	
8	LOSseg	Segment LOS	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	E	E	D	C	D	D	C	C	D	D	

Step #	Variable	Equation/Definition	Saturday Bicycle Peak Hour																																									
			Existing Conditions										Existing plus Project Conditions										Cumulative Conditions										Cumulative plus Project Conditions											
			Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5		Segment #1		Segment #2		Segment #3		Segment #4		Segment #5			
			EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB		
1	Sb	Bicycle Speed (measured or assumed 15 mph)	10	15	10	15	5	15	10	15	10	15	10	15	10	15	5	15	10	15	10	15	10	15	5	15	10	15	10	15	10	15	5	15	10	15	10	15	10	15	10	15		
2	db	db = 0.0	0.00	115.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	115.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	C	Cycle Length	-	186	-	-	-	-	-	-	-	-	-	-	186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	gb	gb=Dp-l1-l2	-	45	-	-	-	-	-	-	-	-	-	-	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Dp	Phase Duration	-	49	-	-	-	-	-	-	-	-	-	-	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	l1	Loss time = 2	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	l2	l2 = Y+Rc-e	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Y	Yellow Interval	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Rc	Red Clearance	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
e	Extension of Effective Green = 2	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3	STb,seg	STb,seg = (3600*L)/(5280*(trb+db))	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	7.93	10.00	15.00	5.00	15.00	10.00	15.00	10.00	15.00	10.00	15.00	10.00	15.00		
	trb	trb = (3600*L)/(5280Sb)	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95	194.32	129.55	31.02	20.68	548.18	182.73	90.95	60.64	266.93	177.95		
4	L	Length (feet)	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915	2850	2850	455	455	4020	4020	1334	1334	3915	3915		
	lb,int	lb,int = 4.1324+Fw+Fv	2.55	2.87	1.37	0.82	2.96	2.23	2.59	1.98	2.17	1.44	2.57	2.89	1.38	0.84	2.97	2.25	2.61	2.00	2.19	1.47	2.60	2.92	1.41	0.87	3.00	2.27	2.64	2.02	2.20	1.48	2.61	2.94	1.42	0.89	3.01	2.29	2.65	2.04	2.22	1.51		
	Fw	Fw = 0.0153*Wcd-0.2144Wt	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-2.24	-2.02	-3.37	-3.95	-1.69	-2.45	-2.12	-2.69	-2.42	-2.24	-2.02	-3.20			
	Wcd	Curb-to-Curb width of Cross Street	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	70	22	22	50	22	22	70	22	70	22	70	22	70	22	70	22	70	22	70	22	70	22		
	Wt	Wt = Wol+Wbl+Ipk*Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5		
	Wol	Outside Lane Width	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2	11	12	16.5	15.6	12	12	14.7	13.1	16.3	16.2		
	Wbl	Bike Lane Width	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Ipk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Wos	Shoulder Width (no curb)	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3	1	1	0.8	4.4	0.9	1	0.2	1	0	0.3		
	Fv	Fv = .0066*(vlt+vth+vrt)/(4*Nth)	0.66	0.76	0.61	0.64	0.52	0.55	0.58	0.54	0.46	0.51	0.68	0.78	0.62	0.66	0.53	0.57	0.60	0.56	0.48	0.54	0.71	0.81	0.65	0.69	0.56	0.59	0.63	0.58	0.49	0.55	0.72	0.83	0.66	0.71	0.57	0.61	0.64	0.60	0.51	0.58		
	vlt	Left-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	vth	Through Demand Flow Rate	401	459	367	390	314	336	354	326	278	310	410	471	376	402	323	348	363	338	292	327	430	492	394	418	337	360	380	350	298	333	439	504	403	430	346	372	389	362	312	350		
	vrt	Right-Turn Demand Flow Rate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	lb,link	lb,link = .760+Fw+Fv+Fs+Fp	3.73	3.69	2.88	2.40	3.51	3.48	3.25	3.33	2.94	2.97	3.74	3.70	2.89	2.41	3.53	3.50	3.26	3.35	2.96	3.00	3.76	3.72	2.91	2.43	3.55	3.51	3.29	3.37	2.97	3.01	3.77	3.74	2.93	2.45	3.56	3.53	3.30	3.38	3.00	3.04		
Fw	Fw = .005*We^2	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36	-0.72	-0.85	-1.50	-2.00	-0.83	-0.85	-1.11	-0.99	-1.33	-1.36			
We	We = Wv + Wt = Wol+Wbl+Wos	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5	12	13	17.3	20	12.9	13	14.9	14.1	16.3	16.5			
ppk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Fv	Fv = .507*ln(vma/(4Nth))	2.40	2.50	2.33	2.36	2.29	2.29	2.31	2.28	2.23	2.29	2.41	2.51	2.34	2.37	2.31	2.31	2.32	2.30	2.25	2.32	2.43	2.53	2.36	2.39	2.33	2.32	2.35	2.32	2.26	2.33	2.44	2.55	2.38	2.41	2.34	2.36	2.33	2.29	2.36				
vma	vma = vm	451	553	395	419	369	365	381	358	323	369	461	567	404	432	380	378	390	371	340	389	483	593	424	449	396	391	409	385	347	396	493	607	433	462	407	404	418	398	363	417			
vm	vm = V/PHF	451	553	395	419	369	365	381	358	323	369	461	567	404	432	380	378	390	371	340	389	483	593	424	449	396	391	409	385	347	396	493	607	433	462	407	404	418	398	363	417			
PHF	Peak Hour Factor	0.89	0.83	0.93	0.93	0.85	0.92	0.93	0.91	0.86	0.84	0.89	0.83	0.93	0.92	0.93	0.85	0.92	0.93	0.91	0.86	0.84	0.89	0.83	0.93	0.92	0.93	0.85	0.92	0.93	0.85	0.92	0.93	0.85	0.92	0.93	0.85	0.92	0.93	0.86	0.84			
Nth	Number of Through Lanes	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Fs	Fs = .199*[1.1199ln(SRa-20)+.8103](1+.1038*PHVa)^2	0.85	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.85	0.84	0.85	0.84	0.85	0.84	0.84	0.84	0.84	0.84	0.84	0.85	0.84	0.85	0.84	0.84	0.85	0.84	0.84	0.84			
SRa	SRa = SR	40																																										