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Memo

To:	Lacombe County	From:	Patrick Wong, P.Eng., PTOE Stantec Edmonton Office
File:	Burbank Estate Lots Development	Date:	November 15, 2016

Reference: Transportation Memo – Burbank Estate Lots Development

INTRODUCTION

This analysis summarizes the traffic impacts of the Burbank Development in Lacombe County (County) on the surrounding roadway network.

According to the concept plan (**Figure 1**), the proposed development will include 14 estate homes each on 1.25ac lots. Two access points will be available off of Township Road 393A that lead into the development in the form of cull de sacs; the access locations are outlined in **Figure 2**.

BACKGROUND TRAFFIC

Background daily traffic volumes were obtained from the County and the Alberta Transportation website (**Table1**).

Table 1 – Trip Generated Rates and Directional Splits

Location	Daily Traffic
Range Road 271A just south of Highway 597 (west end)	617 vpd
Township Road 393 just west of Highway 597 (east end)	85 vpd
Highway 597 just east of Highway 2A	4,860 vpd

Peak hour volumes are needed for the traffic analysis, as per Alberta Transportation's Highway Geometric Design Guide (HGDG):

- DHV = k (AADT), where DHV is the design hourly volume, AADT is the average annual daily traffic and k is a factor equivalent to 0.12.

The DHV was used for both the AM and PM peak hours and it was assumed that the volumes are distributed evenly on the roadway.

As for the background traffic volumes on the internal roadways, assumptions were made to estimate the traffic generated by existing developments in the surrounding areas.

Figure 3 outlines the surrounding developments that are located to the north and east of our proposed development. It was assumed that all traffic accessesing these developments will be heading to/from the west direction as this is the direction towards Blackfalds and Highway 2.

Reference: Transportation Memo – Burbank Estate Lots Development

Trip generation rates from the Institute of Transportation Engineers' (ITE) Trip Generation Manual (9th Edition) for "Single-Family Detached" and "General Light Industrial" were used to establish the background traffic trips expected during both the AM and PM Peak Hours (**Table 2**).

Table 2 – Trip Generated Rates and Directional Splits

Land Use	Code	AM PEAK HOUR			PM PEAK HOUR			Daily Traffic		
		Rate	%In	%Out	Rate	%In	%Out	Rate	%In	%Out
Single Family Detached	210	0.75	25	75	1.0	63	37	9.52	50	50
General Light Industrial	110	7.51	83	17	7.26	22	78	51.80	50	50

The background trips expected are shown in **Table 3**.

Table 3 – Background Traffic Generation in Surrounding Development Area

	Units	AM PEAK HOUR		PM PEAK HOUR		DAILY TRAFFIC	
		IN	OUT	IN	OUT	IN	OUT
North of Study Intersections	Single Family Detached 25 du	5	14	16	9	119	119
East of Study Intersections	Single Family Detached 23 du	4	13	15	8	109	109
	1.5ac Light Industrial	9	2	2	9	39	39

The total background peak hour volumes are shown in **Figure 4** and the total background daily peak hour volumes are shown in **Figure 5**.

PROPOSED DEVELOPMENT

Based on the proposed development and the ITE Trip Generation Rate for "Single Family Detached Housing", the trips expected to be generated by the development are summarized in **Table 4**. Similar to the background volumes, the site generated trips are expected to all be travelling to/from the west along Township Road 393A.

Table 4 – Site Generated Traffic

	Units	AM PEAK HOUR		PM PEAK HOUR		DAILY TRAFFIC	
		IN	OUT	IN	OUT	IN	OUT
East Cull de Sac	6 du	1	4	4	3	28	28
West Cull de Sac	8 du	2	5	5	3	38	38
	Total	**3**	**9**	**9**	**6**	**66**	**66**

The distribution of the site generated traffic is shown in **Figure 6 and Figure 7.**

Reference: Transportation Memo – Burbank Estate Lots Development

The design traffic is the addition of the background traffic and the site generated traffic that is summarized in **Figure 8**.

The daily volumes expected along Township Road 393A in the vicinity of the proposed development is shown in **Figure 9**.

TRANSPORTATION ASSESSMENT

The traffic modeling software package of Synchro has been used to complete an intersection capacity analysis in order to determine the Level of Service (LOS) and the volume/capacity (v/c) ratio which indicates the level of congestion for a specific movement. A LOS-A indicates that the movement experiences a delay of less than 10 seconds, while a v/c ratio closer to 1 indicates the intersection is approaching maximum capacity.

The results of the capacity analysis during the AM and PM peak hours are summarized in **Tables 4 & 5** below. Synchro Outputs are attached.

Table 4 – AM Peak Hour Capacity Analysis Results

	AM PEAK HOUR							
	NB		SB		EB		WB	
	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
Site Access 1/Township Road 393A	0.01	A	n/a	n/a	0.02	A	0	A
Site Access 2/Township Road 393A	0	A	0.01	A	0	A	0	A
Burbank Crescent W/Township Road 393A	n/a	n/a	0.01	A	0	A	0.02	A

Table 5 – PM Peak Hour Capacity Analysis Results

	PM PEAK HOUR							
	NB		SB		EB		WB	
	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS	V/C Ratio	LOS
Site Access 1/Township Road 393A	0	A	n/a	n/a	0.02	A	0	A
Site Access 2/Township Road 393A	0	A	0	A	0.01	A	0	A
Burbank Crescent W/Township Road 393A	n/a	n/a	0	A	0.01	A	0.02	A

According to the results, it appears that the study intersections function with a significant amount of remaining capacity during both the AM and PM peak hours.

The two way-daily traffic expected along Township Road 393A does not exceed 1000 veh/day, therefore a local roadway classification is adequate to support the additional Burbank Development.

Reference: Transportation Memo – Burbank Estate Lots Development

STANTEC CONSULTING LTD.

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Attachment: Figures 1-9, Synchro Outputs

Figure 1.0

Concept Plan

Burbank

Prepared for:
-
-

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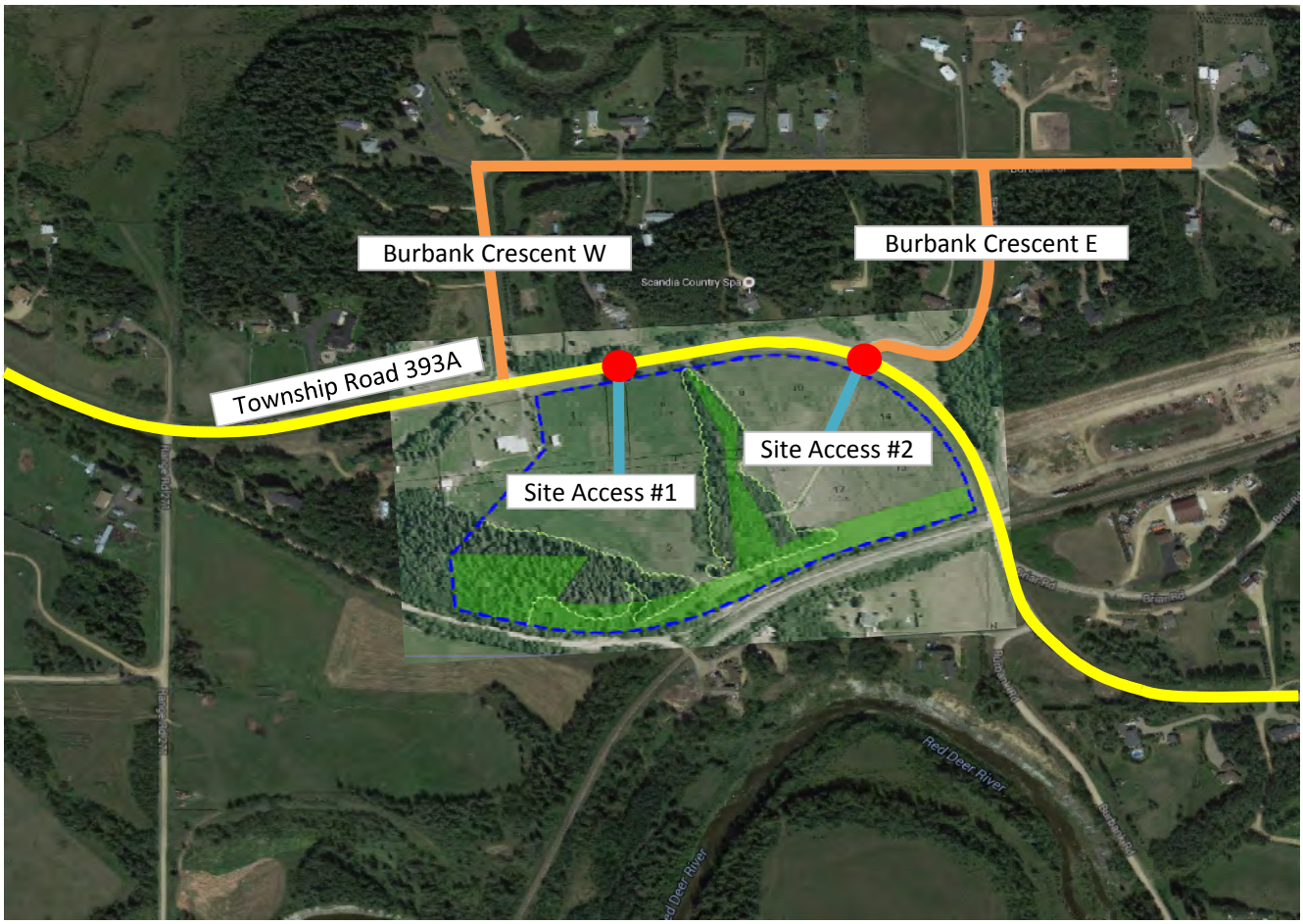
DRAWN BY: SAS
CHECKED BY: GCL
SCALE: NTS
PROJECT #: 1128

November, 2015



Proposed Development

Development Access Intersections

Site Access

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Figure No.
2

Title
Access Locations

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● Study Intersections

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Figure No.
3

Title
Site Context

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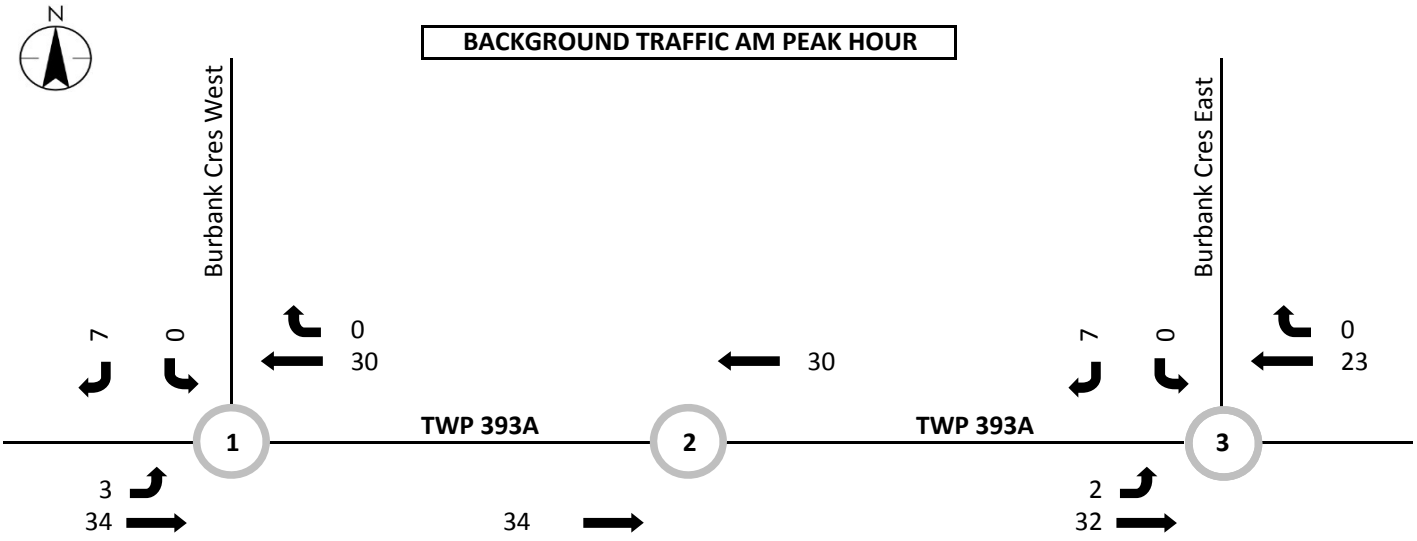

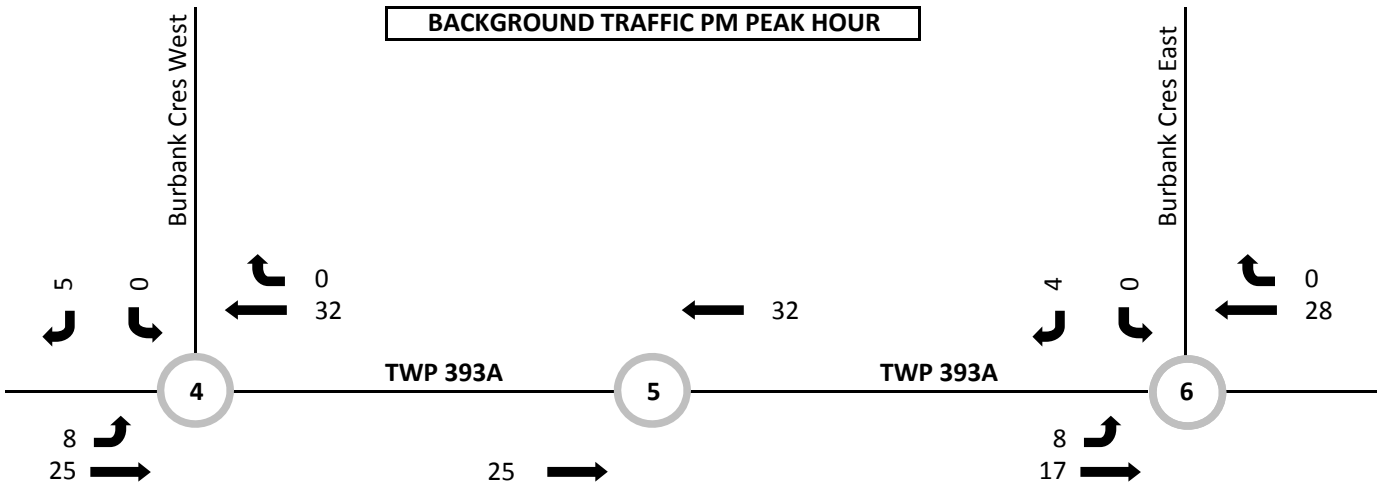

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Figure No.
4

Title
Background Traffic
(AM & PM Peak Hours)

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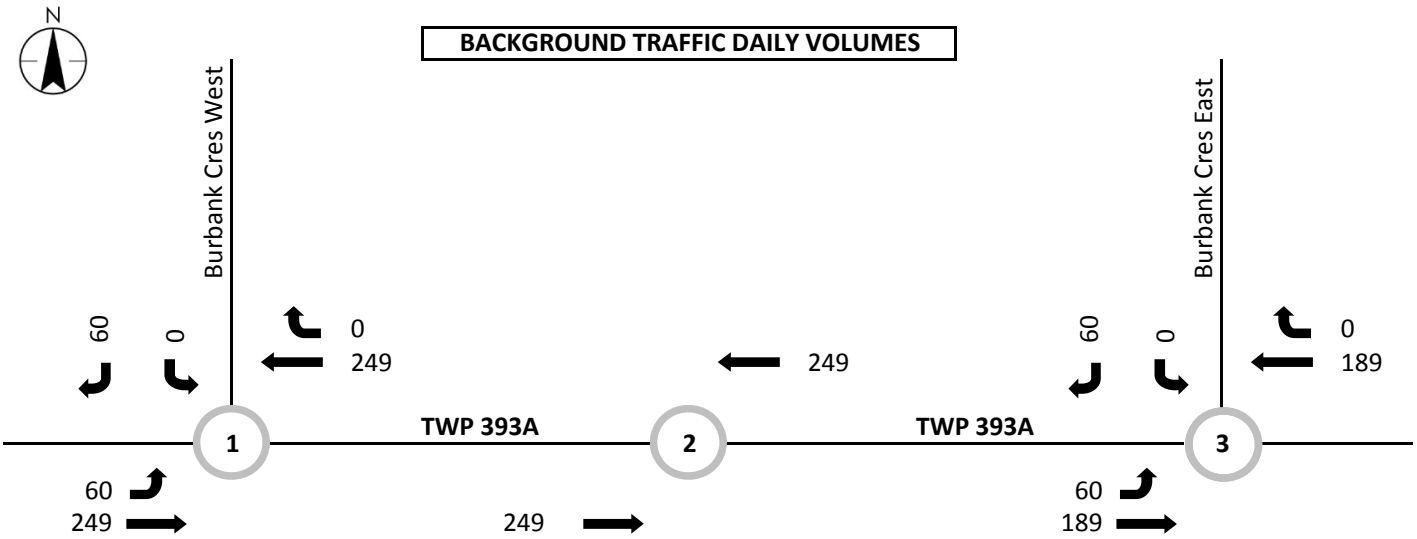

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Figure No.
5

Title
Background Traffic
(Daily Volumes)

November, 2016
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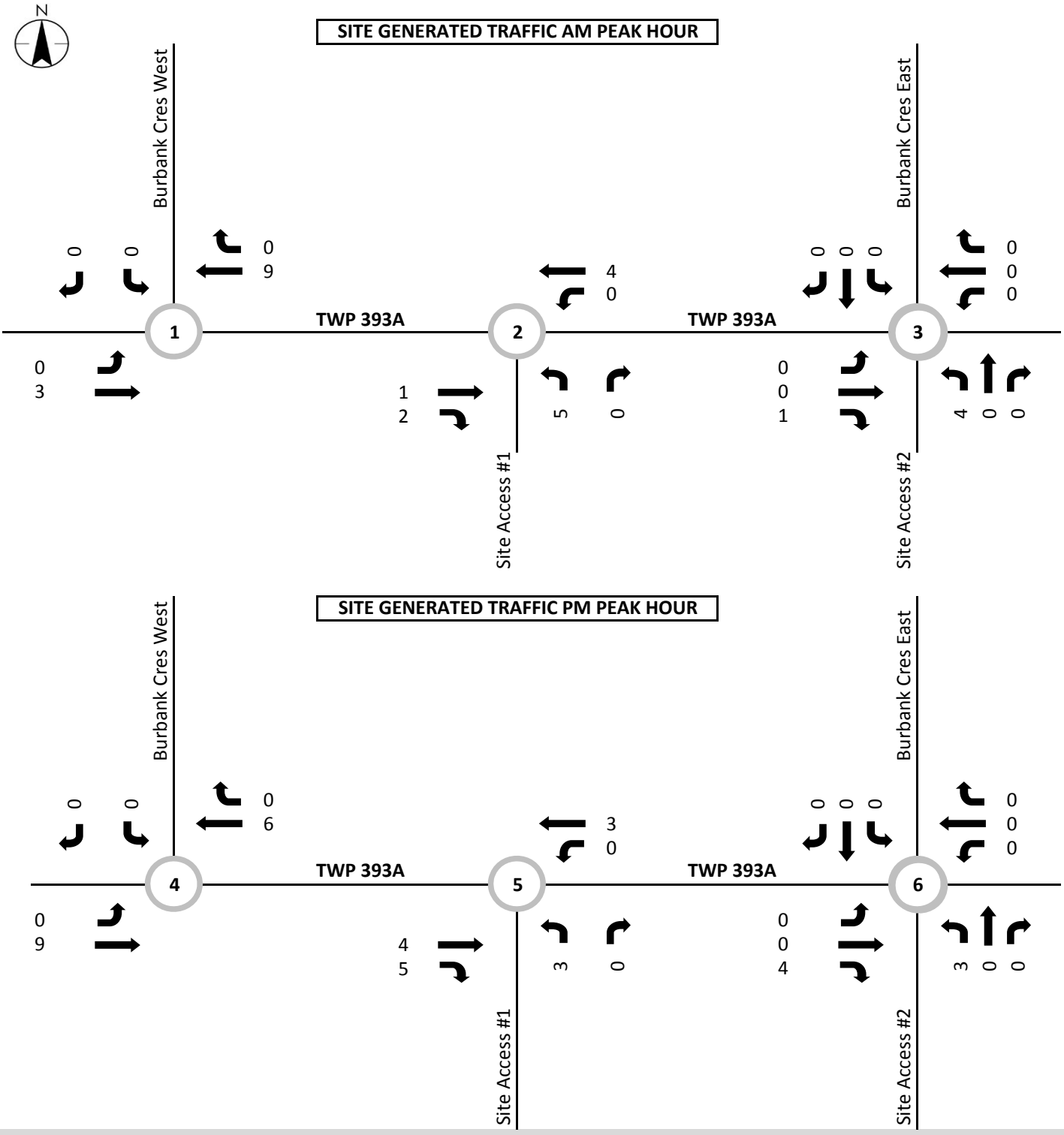

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Figure No.
6

Title
Site Generated Traffic
(AM & PM Peak Hours)

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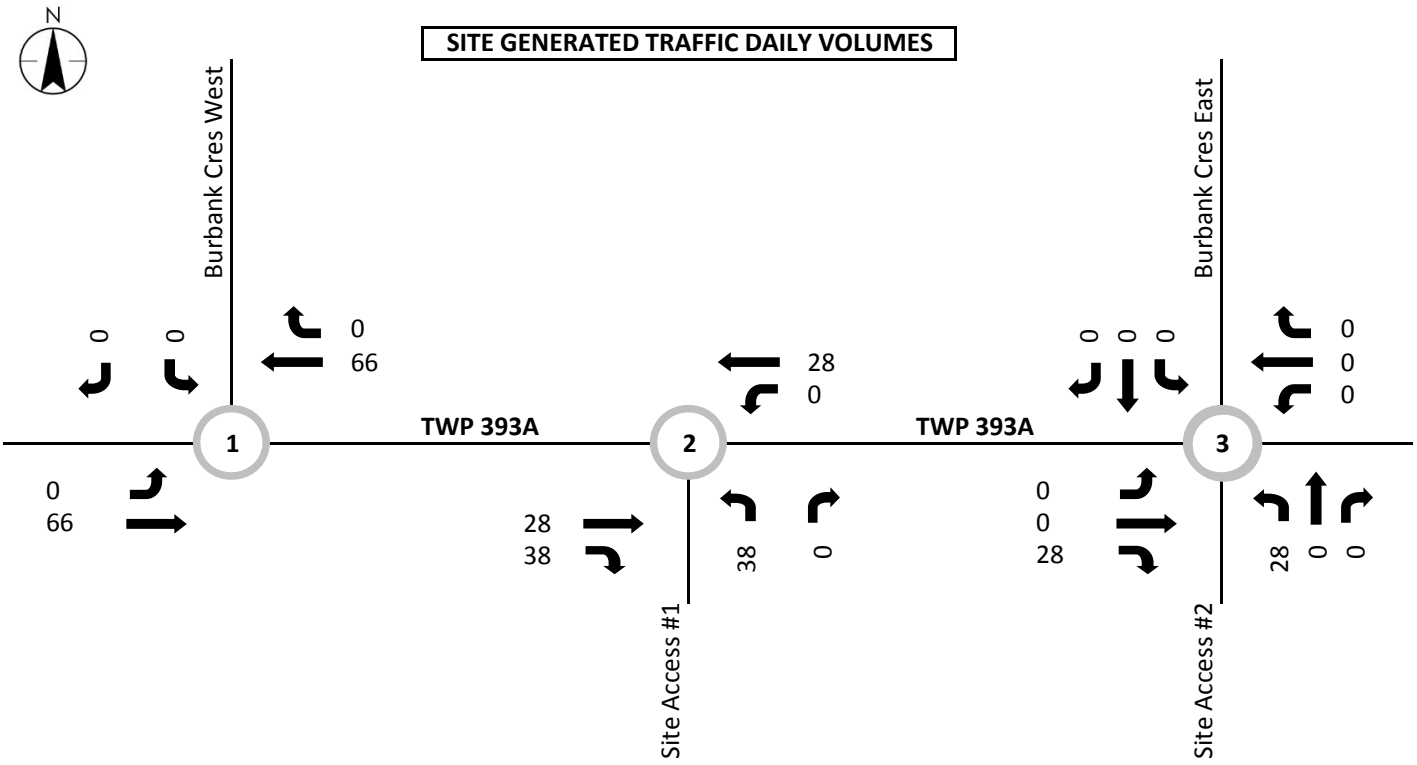

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Figure No.
7

Title
Site Generated Traffic
(Daily Volumes)

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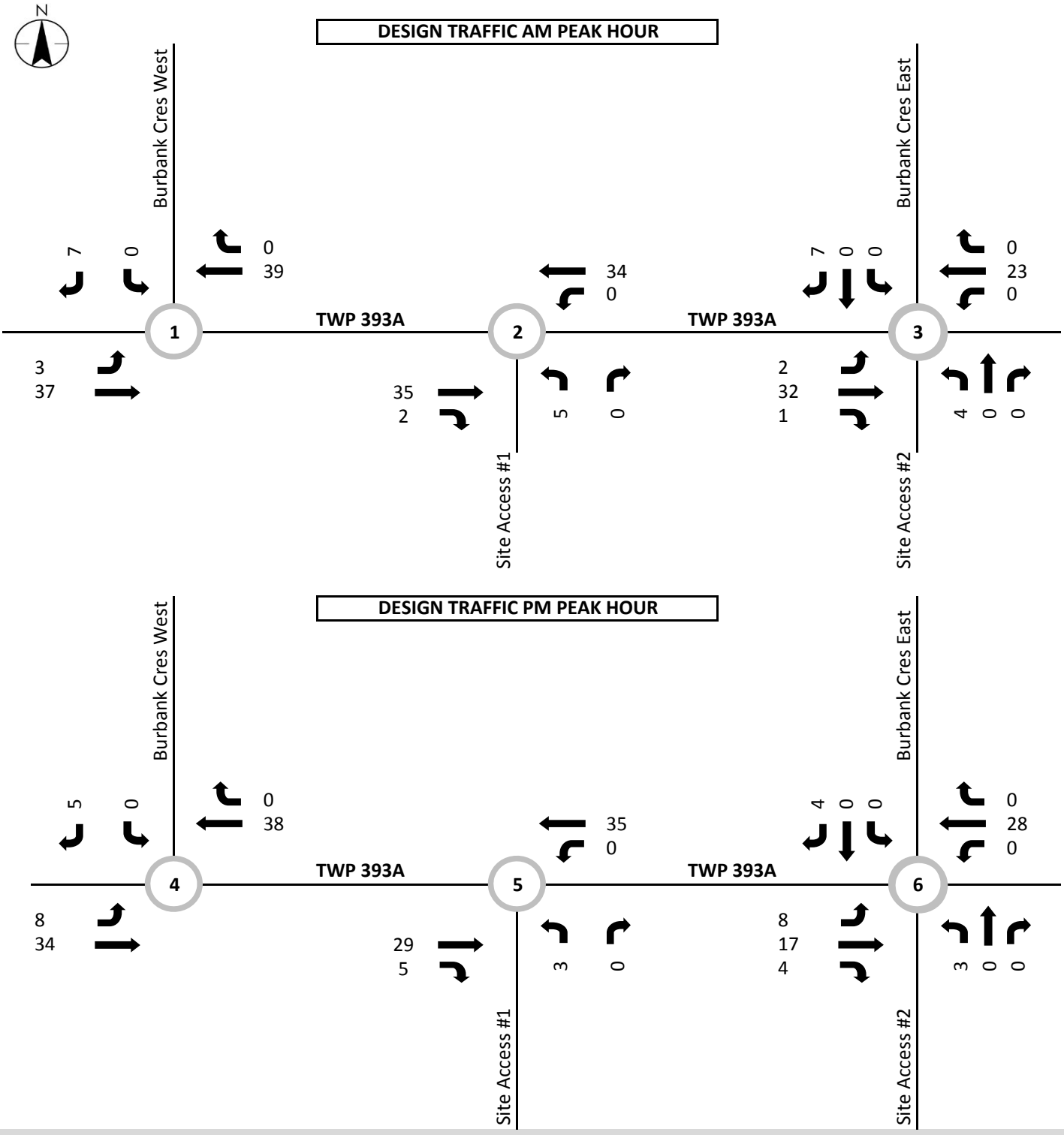

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Figure No.
8

Title
Design Traffic
(AM & PM Peak Hours)

November, 2016
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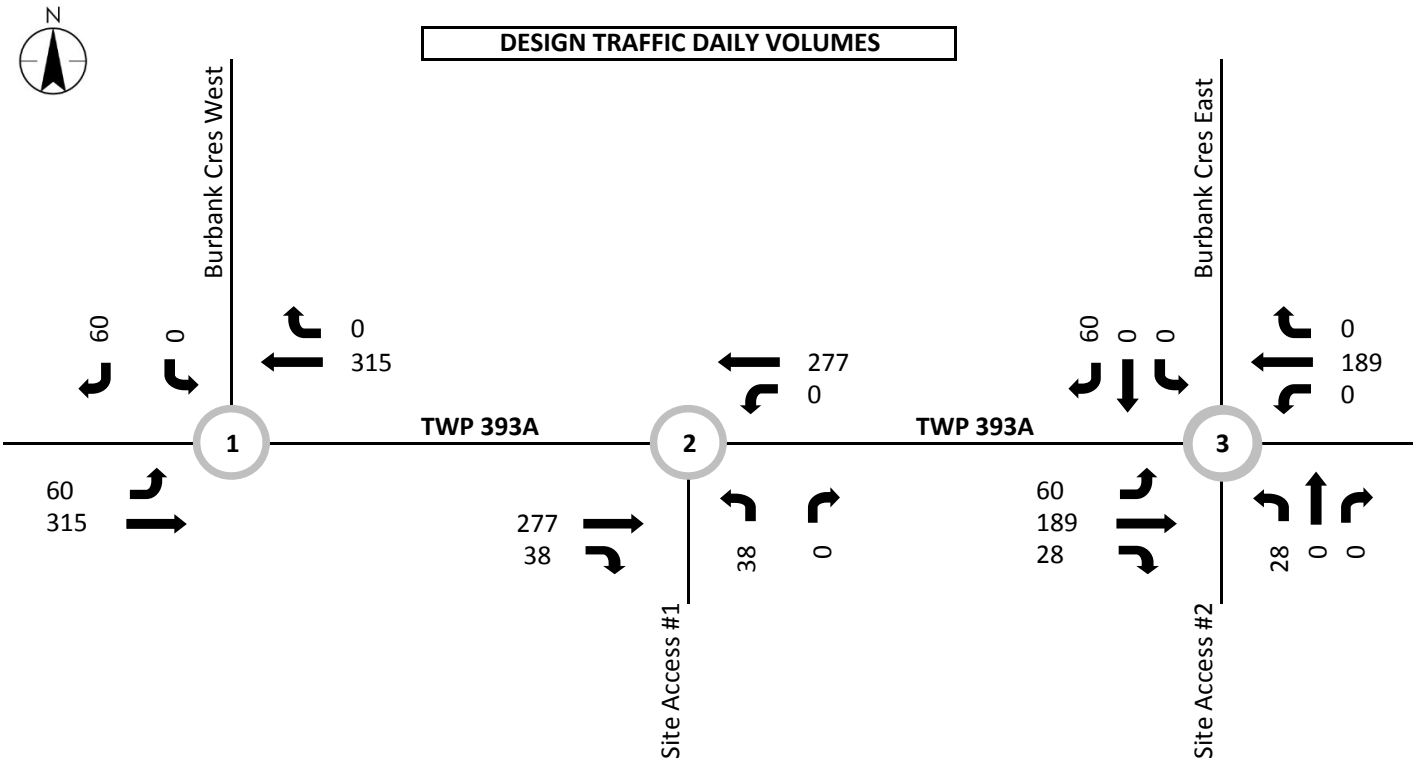

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Figure No.
9

Title
Design Traffic
(Daily Volumes)

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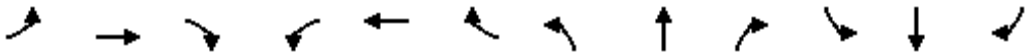
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	35	2	0	34	5	0
Future Volume (Veh/h)	35	2	0	34	5	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	2	0	37	5	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			40		76	39
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			40		76	39
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	100
cM capacity (veh/h)			1570		927	1033

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	40	37	5
Volume Left	0	0	5
Volume Right	2	0	0
cSH	1700	1570	927
Volume to Capacity	0.02	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	8.9
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.9
Approach LOS			A

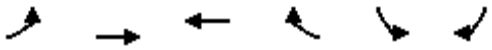
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	32	1	0	23	0	4	0	0	0	0	7
Future Volume (Veh/h)	2	32	1	0	23	0	4	0	0	0	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	35	1	0	25	0	4	0	0	0	0	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	25			36			72	64	36	64	65	25
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			36			72	64	36	64	65	25
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	99
cM capacity (veh/h)	1589			1575			911	825	1037	929	825	1051

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	38	25	4	8
Volume Left	2	0	4	0
Volume Right	1	0	0	8
cSH	1589	1575	911	1051
Volume to Capacity	0.00	0.00	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.1	0.2
Control Delay (s)	0.4	0.0	9.0	8.5
Lane LOS	A		A	A
Approach Delay (s)	0.4	0.0	9.0	8.5
Approach LOS			A	A

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	13.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	37	39	0	0	7
Future Volume (Veh/h)	3	37	39	0	0	7
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	40	42	0	0	8
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	42				88	42
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	42				88	42
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	99
cM capacity (veh/h)	1567				911	1029

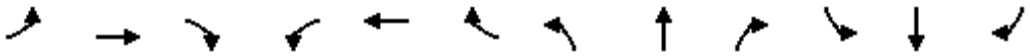
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	43	42	8
Volume Left	3	0	0
Volume Right	0	0	8
cSH	1567	1700	1029
Volume to Capacity	0.00	0.02	0.01
Queue Length 95th (m)	0.0	0.0	0.2
Control Delay (s)	0.5	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	0.5	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	14.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	29	5	0	35	3	0
Future Volume (Veh/h)	29	5	0	35	3	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	5	0	38	3	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			37		72	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			37		72	34
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1574		931	1039

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	37	38	3
Volume Left	0	0	3
Volume Right	5	0	0
cSH	1700	1574	931
Volume to Capacity	0.02	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.1
Control Delay (s)	0.0	0.0	8.9
Lane LOS			A
Approach Delay (s)	0.0	0.0	8.9
Approach LOS			A

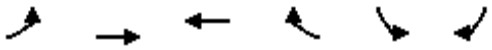
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	17	4	0	28	0	3	0	0	0	0	4
Future Volume (Veh/h)	8	17	4	0	28	0	3	0	0	0	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	18	4	0	30	0	3	0	0	0	0	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	30			22			72	68	20	68	70	30
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	30			22			72	68	20	68	70	30
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	100	100	100
cM capacity (veh/h)	1583			1593			912	818	1058	921	816	1044

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	31	30	3	4
Volume Left	9	0	3	0
Volume Right	4	0	0	4
cSH	1583	1593	912	1044
Volume to Capacity	0.01	0.00	0.00	0.00
Queue Length 95th (m)	0.1	0.0	0.1	0.1
Control Delay (s)	2.1	0.0	9.0	8.5
Lane LOS	A		A	A
Approach Delay (s)	2.1	0.0	9.0	8.5
Approach LOS			A	A

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	18.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	34	38	0	0	5
Future Volume (Veh/h)	8	34	38	0	0	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	37	41	0	0	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	41				96	41
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	41				96	41
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1568				898	1030

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	46	41	5
Volume Left	9	0	0
Volume Right	0	0	5
cSH	1568	1700	1030
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (m)	0.1	0.0	0.1
Control Delay (s)	1.5	0.0	8.5
Lane LOS	A		A
Approach Delay (s)	1.5	0.0	8.5
Approach LOS			A

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		