

**JOHN COLLINS  
ENGINEERS, P.C.** TRAFFIC • TRANSPORTATION ENGINEERS

11 BRADHURST AVENUE • HAWTHORNE, N. Y. • 10532 • (914) 347-7500 • FAX (914) 347-7286

**TRAFFIC IMPACT STUDY**

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Grandview Ave Rt 306 Update  
**TOWN OF RAMAPO, NEW YORK**

From  
JOB NO. 1599  
DECEMBER 18, 2008  
REVISED: JUNE 1, 2010

## **CAPACITY ANALYSIS**

HCS+: Signalized Intersections Release 5.3

Analyst: JCE Inter.: AM1EX  
 Agency: JOHN COLLINS ENGINEERS, P.C. Area Type: All other areas  
 Date: 5/17/2010 Jurisd:  
 Period: WEEKDAY PEAK AM HIGHWAY HOUR Year : 2010 EXISTING TRAFFIC VOLUMES  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE N/S St: NYS ROUTE 306

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig	LTR			LTR			L	TR		L	TR	
Volume	75	195	90	75	225	55	95	215	55	40	245	100
Lane Width	12.0			12.0			10.0	10.0		10.0	10.0	
RTOR Vol	0			0			0			0		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Peds	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Peds	X		
NB Right					EB Right			
SB Right					WB Right			
Green	40.0				40.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	q/c	Delay	LOS	Delay	LOS
<b>Eastbound</b>								
LTR	648	1458	0.62	0.44	23.5	C	23.5	C
<b>Westbound</b>								
LTR	655	1473	0.60	0.44	23.0	C	23.0	C
<b>Northbound</b>								
L	311	700	0.34	0.44	19.3	B		
TR	724	1628	0.41	0.44	18.8	B	18.9	B
<b>Southbound</b>								
L	372	838	0.12	0.44	15.3	B		
TR	712	1602	0.54	0.44	21.2	C	20.6	C

Intersection Delay = 21.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone:  
E-Mail:

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OPERATIONAL ANALYSIS

Analyst: JCE  
 Agency/Co.: JOHN COLLINS ENGINEERS, P.C.  
 Date Performed: 5/17/2010  
 Analysis Time Period: WEEKDAY PEAK AM HIGHWAY HOUR  
 Intersection: AMEX  
 Area Type: All other areas  
 Jurisdiction:  
 Analysis Year: 2010 EXISTING TRAFFIC VOLUMES  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE N/S St: NYS ROUTE 306

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	75	195	90	75	225	55	95	215	55	40	245	100
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	21	54	25	21	63	15	26	60	15	11	68	28
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900		1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Lane Width		12.0			12.0		10.0	10.0		10.0	10.0	
RTOR Vol			0			0			0			0
Adj Flow		400			394		106	300		44	383	
%InSharedLn												
Prop LTs		0.207			0.211		1.000	0.000		1.000	0.000	
Prop RTs		0.250			0.155			0.203			0.290	
Feds Bikes		25	0		25	0		25	0		25	0
Buses		0			0		0	0		0	0	
%InProtPhase												
Duration	0.25	Area Type: All other areas										

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0		0.0	0.0		0.0	0.0	
Arriv. Type		3			3		3	3		3	3	
Unit Ext.		3.0			3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0		2.0	2.0		2.0	2.0	
Ext of g		2.0			2.0		2.0	2.0		2.0	2.0	
Ped Min g		3.4			3.4			3.4			3.4	

LaneGroup	Eastbound		Westbound		Northbound		Southbound			
	LTR		LTR		L	TR	L	TR		
Init Queue	0.0		0.0		0.0	0.0	0.0	0.0		
Flow Rate	400		394		106	300	44	383		
So	1900		1900		1900	1900	1900	1900		
No.Lanes	1	0	1	0	1	1	0	1	1	0
SL	1458		1473		700	1628	838	1602		
LnCapacity	648		655		311	724	372	712		
Flow Ratio	0.3		0.3		0.2	0.2	0.1	0.2		
v/c Ratio	0.62		0.60		0.34	0.41	0.12	0.54		
Grn Ratio	0.44		0.44		0.44	0.44	0.44	0.44		
I Factor	1.000		1.000			1.000		1.000		
AT or PVG	3		3		3	3	3	3		
Pltn Ratio	1.00		1.00		1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00	1.00	1.00	1.00		
Q1	7.7		7.5		1.7	5.1	0.6	7.0		
kB	0.8		0.8		0.5	0.9	0.6	0.9		
Q2	1.3		1.2		0.3	0.6	0.1	1.0		
Q Average	9.0		8.7		2.0	5.7	0.7	8.0		
Q Spacing	25.0		25.0		25.0	25.0	25.0	25.0		
Q Storage	0		0		0	0	0	0		
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2		1.3	1.2	1.3	1.2		
BOQ	10.9		10.6		2.5	7.1	0.9	9.8		
QSRatio										
85th Percentile Output:										
fB%	1.4		1.5		1.6	1.5	1.7	1.5		
BOQ	13.0		12.6		3.2	8.6	1.2	11.7		
QSRatio										
90th Percentile Output:										
fB%	1.6		1.6		1.8	1.7	1.9	1.6		
BOQ	14.2		13.8		3.7	9.5	1.4	12.8		
QSRatio										
95th Percentile Output:										
fB%	1.8		1.8		2.3	1.9	2.5	1.8		
BOQ	15.8		15.5		4.5	11.0	1.8	14.4		
QSRatio										
98th Percentile Output:										
fB%	1.9		2.0		2.7	2.2	3.0	2.0		
BOQ	17.5		17.1		5.4	12.5	2.2	16.0		
QSRatio										

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ERROR MESSAGES

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No errors to report.

HCS+: Signalized Intersections Release 5.3

Analyst: JCE  
 Agency: JOHN COLLINS ENGINEERS, P.C.  
 Date: 5/17/2010  
 Period: WEEKDAY PEAK PM HIGHWAY HOUR  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE

Inter.: PMiEX  
 Area Type: All other areas  
 Jurisd:  
 Year : 2010 EXISTING TRAFFIC VOLUMES  
 N/S St: NYS ROUTE 306

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig	LTR			LTR			L	TR		L	TR	
Volume	60	205	70	50	200	35	45	265	50	35	250	50
Lane Width	12.0			12.0			10.0	10.0		10.0	10.0	
RTOR Vol	0			0			0			0		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase	Combination	1	2	3	4	5	6	7	8
EB	Left	P				NB	Left	P	
	Thru	P					Thru	P	
	Right	P					Right	P	
	Peds	X					Peds	X	
WB	Left	P				SB	Left	P	
	Thru	P					Thru	P	
	Right	P					Right	P	
	Peds	X					Peds	X	
NB	Right					EB	Right		
SB	Right					WB	Right		
Green		40.0					40.0		
Yellow		3.0					3.0		
All Red		2.0					2.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
LTR	687	1545	0.54	0.44	21.4	C	21.4	C
Westbound								
LTR	694	1562	0.46	0.44	19.6	B	19.6	B
Northbound								
L	347	781	0.14	0.44	15.7	B		
TR	729	1641	0.48	0.44	19.9	B	19.4	B
Southbound								
L	335	754	0.12	0.44	15.4	B		
TR	728	1639	0.46	0.44	19.5	B	19.1	B

Intersection Delay = 19.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone:  
E-Mail:

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OPERATIONAL ANALYSIS

Analyst: JCE  
 Agency/Co.: JOHN COLLINS ENGINEERS, P.C.  
 Date Performed: 5/17/2010  
 Analysis Time Period: WEEKDAY PEAK PM HIGHWAY HOUR  
 Intersection: FM1EX  
 Area Type: All other areas  
 Jurisdiction:  
 Analysis Year: 2010 EXISTING TRAFFIC VOLUMES  
 Project ID: 1599  
 R/W St: GRANDVIEW AVENUE N/S St: NYS ROUTE 306

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	60	205	70	50	200	35	45	265	50	35	250	50
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	17	57	19	14	56	10	13	74	14	10	69	14
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900		1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Lane Width		12.0			12.0		10.0	10.0		10.0	10.0	
RTOR Vol			0			0			0			0
Adj Flow		373			317		50	350		39	334	
%InSharedLn												
Prop LTs		0.180			0.177		1.000	0.000		1.000	0.000	
Prop RTs		0.209			0.123			0.160			0.168	
Peds Bikes		25	0		25	0		25	0		25	0
Buses		0			0			0			0	
%InProtPhase												
Duration	0.25	Area Type: All other areas										

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0		0.0	0.0		0.0	0.0	
Arriv. Type		3			3		3	3		3	3	
Unit Ext.		3.0			3.0		3.0	3.0		3.0	3.0	
T Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0		2.0	2.0		2.0	2.0	
Ext of g		2.0			2.0		2.0	2.0		2.0	2.0	
Ped Min g		3.4			3.4			3.4			3.4	

LaneGroup	Eastbound		Westbound		Northbound		Southbound	
	LTR		LTR		L	TR	L	TR
Init Queue	0.0		0.0		0.0	0.0	0.0	0.0
Flow Rate	373		317		150	350	139	334
Se	1900		1900		1900	1900	1900	1900
No.Lanes	1	0	1	0	1	1	1	0
SL	1545		1562		1781	1641	1754	1639
LnCapacity	687		694		1347	729	1335	728
Flow Ratio	0.2		0.2		0.1	0.2	0.1	0.2
v/c Ratio	0.54		0.46		0.14	0.48	0.12	0.46
Grn Ratio	0.44		0.44		0.44	0.44	0.44	0.44
l Factor	1.000		1.000			1.000		1.000
AT or PVG	3		3		3	3	3	3
Pltn Ratio	1.00		1.00		1.00	1.00	1.00	1.00
PF2	1.00		1.00		1.00	1.00	1.00	1.00
Q1	6.8		5.5		0.7	6.2	0.6	5.8
kB	0.9		0.9		0.5	0.9	0.5	0.9
Q2	1.0		0.7		0.1	0.8	0.1	0.8
Q Average	7.8		6.3		0.8	7.0	0.6	6.6
Q Spacing	25.0		25.0		25.0	25.0	25.0	25.0
Q Storage	0		0		0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.3	1.2	1.3	1.2
BOQ	9.6		7.7		1.1	8.6	0.8	8.1
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5		1.7	1.5	1.7	1.5
BOQ	11.5		9.3		1.4	10.3	1.1	9.8
QSRatio								
90th Percentile Output:								
fB%	1.6		1.6		1.9	1.6	1.9	1.6
BOQ	12.6		10.3		1.6	11.4	1.2	10.8
QSRatio								
95th Percentile Output:								
fB%	1.8		1.9		2.4	1.8	2.5	1.9
BOQ	14.2		11.8		2.0	12.9	1.6	12.3
QSRatio								
98th Percentile Output:								
fB%	2.0		2.1		3.0	2.1	3.0	2.1
BOQ	15.8		13.3		2.5	14.5	1.9	13.9
QSRatio								

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ERROR MESSAGES

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No errors to report.

HCS+: Signalized Intersections Release 5.3

Analyst: JCE  
 Agency: JOHN COLLINS ENGINEERS, P.C.  
 Date: 5/17/2010  
 Period: WEEKDAY PEAK AM HIGHWAY HOUR  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE

Inter.: AM1NB  
 Area Type: All other areas  
 Jurisd:  
 Year : 2013 NO-BUILD TRAFFIC VOLUMES  
 N/S St: NYS ROUTE 306

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig	LTR			LTR			L	TR		L	TR	
Volume	80	220	100	100	255	66	104	259	68	47	314	107
Lane Width	12.0			12.0			10.0	10.0		10.0	10.0	
RTOR Vol	0			0			0			0		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Peds	X		
WB Left	P				SB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Peds	X		
NB Right					EB Right			
SB Right					WB Right			
Green	40.0				40.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS
<b>Eastbound</b>								
LTR	627	1411	0.71	0.44	26.9	C	26.9	C
<b>Westbound</b>								
LTR	603	1356	0.77	0.44	30.6	C	30.6	C
<b>Northbound</b>								
L	252	566	0.46	0.44	23.4	C		
TR	723	1626	0.50	0.44	20.4	C	21.1	C
<b>Southbound</b>								
L	325	731	0.16	0.44	16.0	B		
TR	717	1613	0.65	0.44	24.1	C	23.3	C

Intersection Delay = 25.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone:  
E-Mail:

Fax:

OPERATIONAL ANALYSIS

Analyst: JCE  
 Agency/Co.: JOHN COLLINS ENGINEERS, P.C.  
 Date Performed: 5/17/2010  
 Analysis Time Period: WEEKDAY PEAK AM HIGHWAY HOUR  
 Intersection: AM1NB  
 Area Type: All other areas  
 Jurisdiction:  
 Analysis Year: 2013 NO-BUILD TRAFFIC VOLUMES  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE N/S St: NYS ROUTE 306

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	80	220	100	100	255	66	104	259	68	47	314	107
% Heavy Veh	5	5	5	5	5	5	5	5	5	5	5	5
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	22	61	28	28	71	18	29	72	19	13	87	30
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat		1900			1900		1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig		LTR			LTR		L	TR		L	TR	
Lane Width		12.0			12.0		10.0	10.0		10.0	10.0	
RTOR Vol			0			0			0			0
Adj Flow		444			467		116	364		52	468	
%InSharedLn												
Prop LTs		0.200			0.238		1.000	0.000		1.000	0.000	
Prop RTs		0.250			0.156			0.209			0.254	
Peds Bikes		25	0		25	0		25	0		25	0
Buses		0			0		0	0		0	0	
%InProtPhase												
Duration	0.25	Area Type: All other areas										

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0		0.0	0.0		0.0	0.0	
Arriv. Type		3			3		3	3		3	3	
Unit Ext.		3.0			3.0		3.0	3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time		2.0			2.0		2.0	2.0		2.0	2.0	
Ext of g		2.0			2.0		2.0	2.0		2.0	2.0	
Ped Min g		3.4			3.4			3.4			3.4	

	Eastbound		Westbound		Northbound		Southbound	
	LTR		LTR		L	TR	L	TR
LaneGroup								
Init Queue	0.0		0.0		0.0	0.0	0.0	0.0
Flow Rate	444		467		116	364	52	468
So	1900		1900		1900	1900	1900	1900
No. Lanes	1	0	1	0	1	1	1	1
SL	1411		1356		566	1626	731	1613
LnCapacity	627		603		252	723	325	717
Flow Ratio	0.3		0.3		0.2	0.2	0.1	0.3
v/c Ratio	0.71		0.77		0.46	0.50	0.16	0.65
Grn Ratio	0.44		0.44		0.44	0.44	0.44	0.44
l Factor	1.000		1.000			1.000		1.000
AT or PVG	3		3		3	3	3	3
Pltn Ratio	1.00		1.00		1.00	1.00	1.00	1.00
PF2	1.00		1.00		1.00	1.00	1.00	1.00
Q1	9.0		9.9		2.0	6.5	0.8	9.2
kB	0.8		0.8		0.4	0.9	0.5	0.9
Q2	1.8		2.4		0.4	0.9	0.1	1.6
Q Average	10.8		12.3		2.4	7.4	0.9	10.8
Q Spacing	25.0		25.0		25.0	25.0	25.0	25.0
Q Storage	0		0		0	0	0	0
Q S Ratio								
70th Percentile Output:								
fb%	1.2		1.2		1.3	1.2	1.3	1.2
BOQ	13.1		14.9		3.0	9.1	1.1	13.1
QSRatio								
85th Percentile Output:								
fb%	1.4		1.4		1.6	1.5	1.7	1.4
BOQ	15.6		17.5		3.8	10.9	1.4	15.5
QSRatio								
90th Percentile Output:								
fb%	1.6		1.5		1.8	1.6	1.9	1.6
BOQ	16.9		19.0		4.3	12.0	1.7	16.8
QSRatio								
95th Percentile Output:								
fb%	1.7		1.7		2.2	1.8	2.4	1.7
BOQ	18.6		20.7		5.3	13.6	2.1	18.5
QSRatio								
98th Percentile Output:								
fb%	1.9		1.8		2.6	2.0	3.0	1.9
BOQ	20.3		22.5		6.3	15.1	2.6	20.2
QSRatio								

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ERROR MESSAGES

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No errors to report.

HCS+: Signalized Intersections Release 5.3

Analyst: JCE Inter.: PMiNB  
 Agency: JOHN COLLINS ENGINEERS, P.C. Area Type: All other areas  
 Date: 5/17/2010 Jurisd:  
 Period: WEEKDAY PEAK PM HIGHWAY HOUR Year : 2013 NO-BUILD TRAFFIC VOLUMES  
 Project ID: 1599  
 E/W St: GRANDVIEW AVENUE N/S St: NYS ROUTE 306

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	1	1	0	1	1	0
LGConfig	LTR			LTR			L	TR		L	TR	
Volume	65	229	79	82	226	43	52	344	65	42	309	54
Lane Width	12.0			12.0			10.0	10.0		10.0	10.0	
RTOR Vol	0			0			0			0		

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left	P		
Thru	P				Thru	P		
Right	P				Right	P		
Peds	X				Peds	X		
WB Left	P				SB Left	F		
Thru	P				Thru	F		
Right	P				Right	F		
Peds	X				Peds	X		
NB Right					EB Right			
SB Right					WB Right			
Green	40.0				40.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios		Lane Group		Approach	
			v/c	g/C	Delay	LOS	Delay	LOS

Eastbound

LTR 678 1525 0.61 0.44 23.1 C 23.1 C

Westbound

LTR 634 1426 0.62 0.44 23.5 C 23.5 C

Northbound

L 298 670 0.19 0.44 16.7 B  
 TR 729 1641 0.62 0.44 23.2 C 22.4 C

Southbound

L 261 588 0.18 0.44 16.6 B  
 TR 731 1644 0.55 0.44 21.3 C 20.9 C

Intersection Delay = 22.4 (sec/veh) Intersection LOS = C