The Traffic Group®

A VETERAN-OWNED SMALL BUSINESS

CORPORATE OFFICE
Baltimore, MD
Suite H
9900 Franklin Square Drive
Baltimore, Maryland 21236
410.931.6600
fax: 410.931.6601
1.800.583.8411

FIELD LOCATIONS

Arkansas
Maryland
New York
North Carolina
Ohio
Texas
Virginia
West Virginia

Attachment F

October 2, 2014

Mr. Brandon Freeman
Charles P. Johnson and Associates
1751 Elton Road
Silver Spring, Maryland 21093

RE: Rockwood Manor
Montgomery County, Maryland
Our Job No: 2014-0615

Dear Mr Blass:

The Traffic Group, Inc. has had an opportunity to conduct a Preliminary Assessment of the proposed changes to the Rockwood Manor facility located in the Potomac area of Montgomery County. The Rockwood Manor Property is located in the northeast quadrant of the McArthur Boulevard and Belfast Road intersection as shown on Exhibit 1. At the present time, the subject facility is served by a single point of access along McArthur Boulevard for vehicles entering and exiting the subject site. In order to provide a more efficient operation on the subject site, it is currently proposed that access to the property be modified to include a single point of access inbound along McArthur Boulevard and a single point of egress along Belfast Road. A copy of the preliminary site plan is shown on Exhibit 2.

McArthur Boulevard is a two lane north/south roadway in the vicinity of the subject property. The posted speed limit along McArthur Boulevard is 35 MPH. Belfast Road is a two lane east/west roadway which intersects McArthur Boulevard along the east side. The Belfast Road approach to McArthur Boulevard is presently controlled by a stop sign. The posted speed limit along Belfast Road is 25 MPH. Exhibit 3 was prepared to show the existing lane use and traffic control along the adjacent roadways.

The Traffic Group, Inc., conducted 24-hour machine counts along McArthur Boulevard and Belfast Road from Wednesday, June 18th, 2014 to Monday, June 23, 2014. These counts were conducted to determine the hourly directional traffic along each of these roadways. A summary showing the total vehicles observed during each of the one hour intervals for each day is contained in Appendix A to this letter.

For the purposes of this analysis, we have presented a "worst case" scenario by using the highest volume observed during the morning and evening peak hours on any of the days that were counted and the highest one hour volumes observed on the weekend. Exhibit 4 was prepared to show the existing peak hour volumes along each of the study area roadways for both the weekday morning and evening peak hour and the weekend peak hour.

In anticipation of future growth along the adjacent roadways, we have adjusted the existing peak hour volumes to reflect a 2% growth per year for a three year period to represent conditions in the design year of the subject project. The 2017 peak hour volumes are shown on Exhibit 5.

Trip Generation

The Rockwood Manor facility has the capacity for approximately 170 individuals indoors or 200 individuals for an outdoor event. Based on this information, for the purposes of this analysis we are presenting a "worst case" scenario and assuming an event for 200 people.

Based on studies obtained of other similar type facilities, we have prepared Exhibit 6 which shows the trips projected to be generated by the subject facility for both the weekday morning and evening peak hours and the weekend peak hour. Once again, these numbers are based on the maximum capacity of the subject facility and the highest one hour volumes along the adjacent roadways..

The peak hour trips shown on Exhibit 6 were then distributed and assigned to the nearby road system as shown on Exhibit 7. Exhibit 8 shows the total peak hour volumes, which combines the trips projected to be generated by the subject facility along with the background traffic conditions.

Intersection Capacity Analyses and Two-Lane Highway Capacity Manual Methodology Analysis have been conducted for the study area roadways and intersections and the results are shown on Exhibit 9. Copies of the capacity worksheets are contained in Appendix B of this report.

A review of Exhibit 9 indicates that both of the access points to the subject facility along with the Belfast Road and McArthur Boulevard roadway segments are projected to operate at acceptable levels of service based on accepted standards for Montgomery County even when assuming an extreme worst case for the use of the subject facility.

Summary of Findings

Based on the information contained in this Technical Memorandum, it is our opinion that the proposed modifications to the Rockwood Manor Facility would not result in unsatisfactory traffic conditions along the adjacent roadways in Montgomery County.

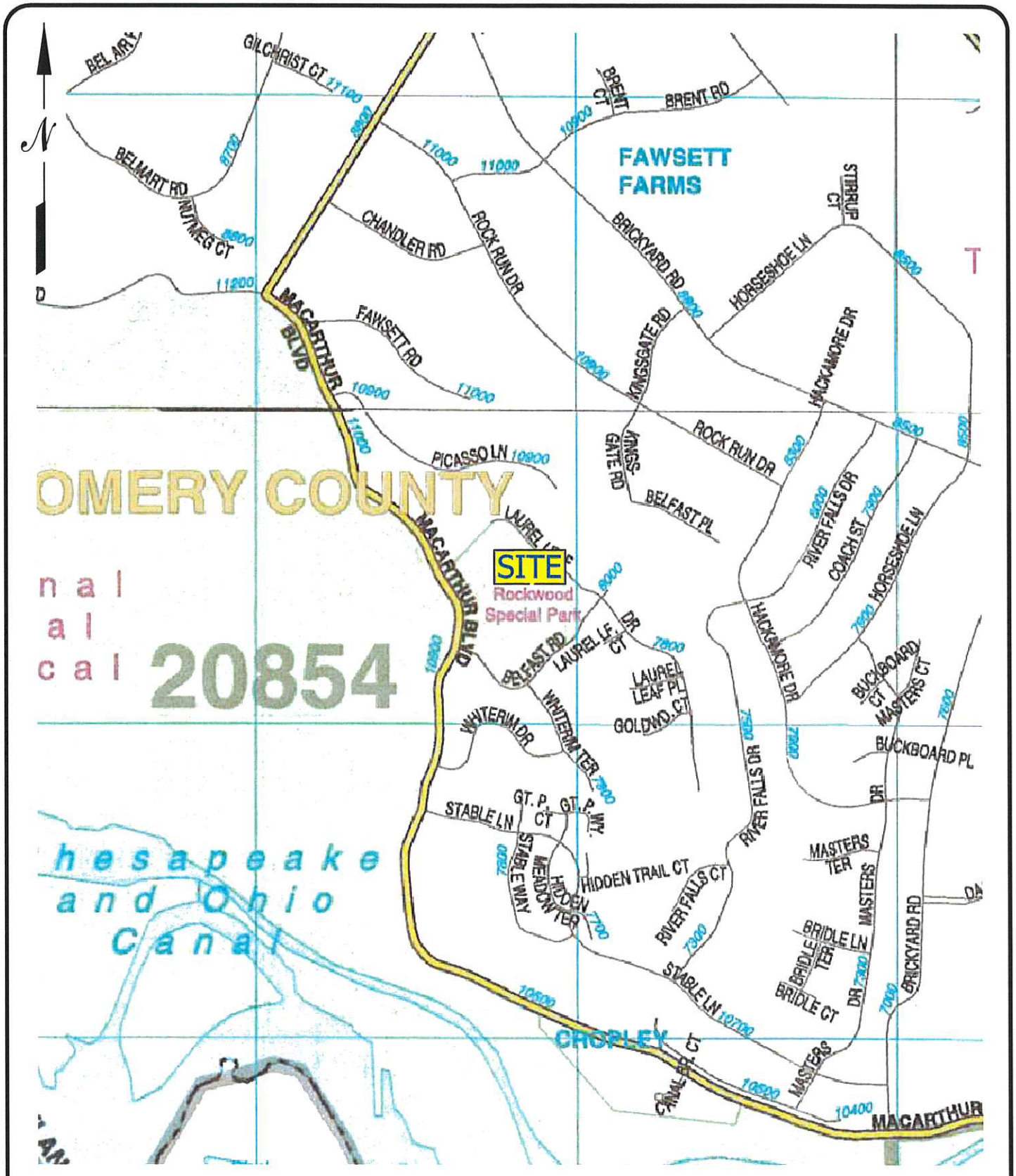
If you have any questions concerning this information, please do not hesitate to contact me.

Sincerely,

Glenn Cook

Glenn Cook
Vice President

GEC/clg
(F:\2014\2014-0615_Rockwood Manor\DOCS\CORRESP\ANALYST\Technical Memorandum.docx)



1,000 ft

EXHIBIT 1
SITE LOCATION MAP

myc, 140615_rockwood manor\initial\ex.dwg-loc_st, f10/3/2014

VEHICULAR CIRCULATION
1. Alternate Exit Drive on Belfast Road

EXHIBIT 2

Maryland - National Capital Park and Planning Commission
9500 Brunett Avenue Silver Spring Maryland 20901 301 495 2500

Oehme, van Sweden & Associates, Inc.
800 G Street, S.E. Washington DC 20003 202 546 7575 fax 202 546 1035
LANDSCAPE ARCHITECTS

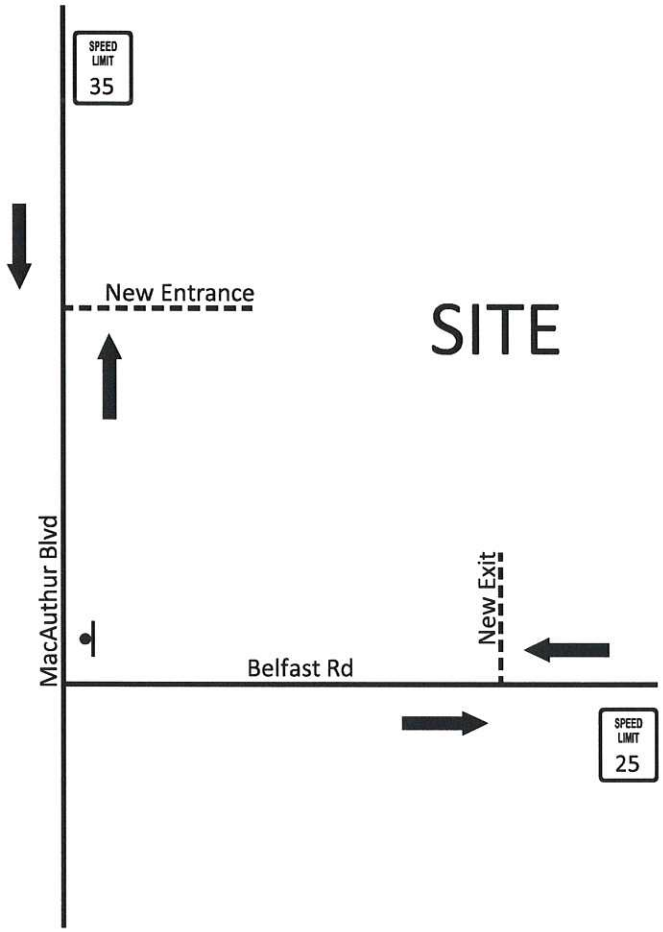
Rockwood Manor Feasibility Study

Potomac, Maryland

Charrette Sketch Alternative B

April 28, 2014

The Traffic Group, Inc.
Since 1985

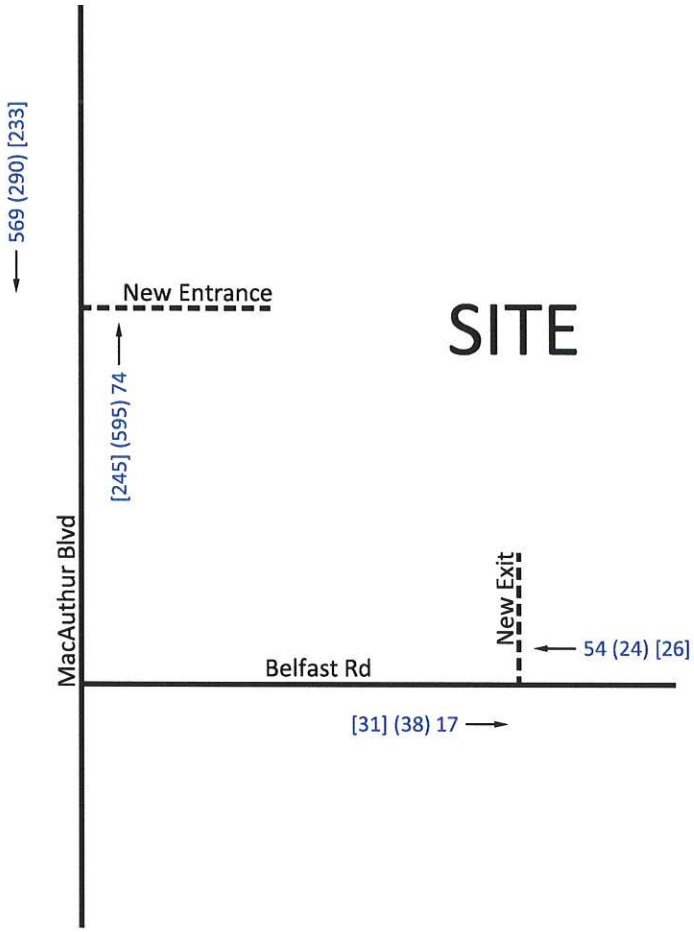


: Stop Sign

NOT TO SCALE

EXHIBIT 3
EXISTING LANE USE

myc, 140615_rockwood manor\initial\ex.dwg-lu-exist, f7/10/2014



NOT TO SCALE

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR
[00] - WEEKEND PEAK HOUR

EXHIBIT 4
EXISTING PEAK HOUR TRAFFIC VOLUMES

myc, 140615_rockwood manor\initial\ex.dwg-exist, f7/10/2014

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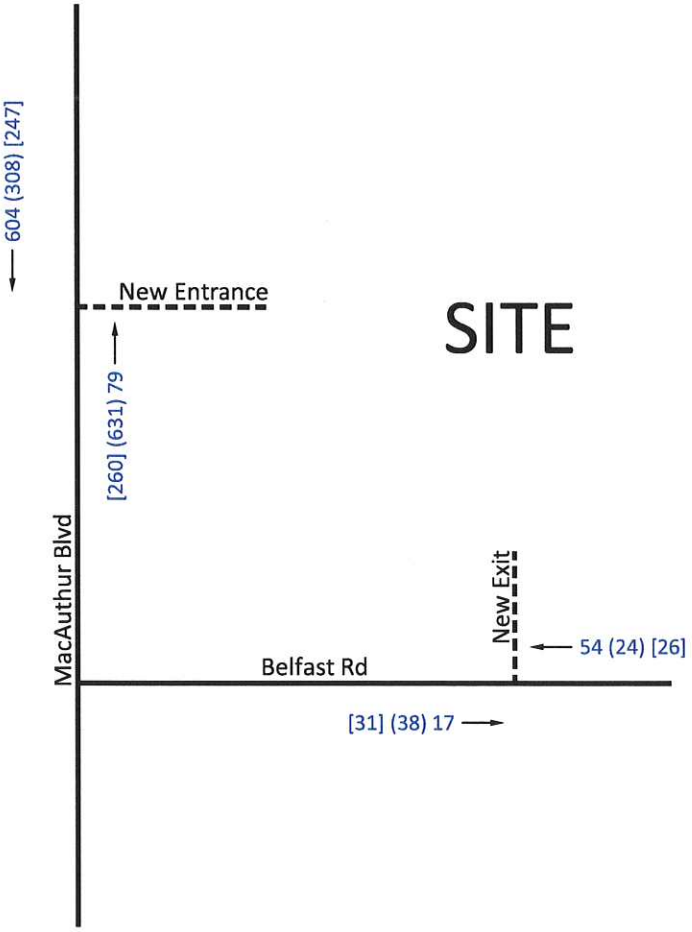

Note: Traffic growth of 2% per year was applied to through traffic along MacAuthur Blvd for 3 years.

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NOT TO SCALE

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR
[00] - WEEKEND PEAK HOUR

EXHIBIT 5
BACKGROUND PEAK HOUR TRAFFIC VOLUMES

myc, 140615_rockwood manor\initial\ex.dwg-back, f7/10/2014

TRIP GENERATION

	MORNING PEAK HOUR			EVENING PEAK HOUR			WEEKEND PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Rockwood Manor									
Banquet Hall Trip Rate(trips/seat)	***0.28***	***0***	***0.28***	***0.28***	***0.15***	***0.43***	***0.28***	***0.15***	***0.43***
200 Seats	56	0	56	56	30	86	56	30	86

Note:
1. The following resources were reviewed to determine the trip rates for banquet facilities. The highest rates are choosen for a more conservative approach.
   a. TIS for Valhalla Brandywine prepared by McMahon, Oct 14, 2008.
   b. TIS for The Regent at Stone House prepared by The Traffic Group, Jul 1, 2014.
   c. Trip generation rates from NJDOT.
2. It is assumed that there are only inbound trips during the morning peak hour and they are the same as evening peak hours.

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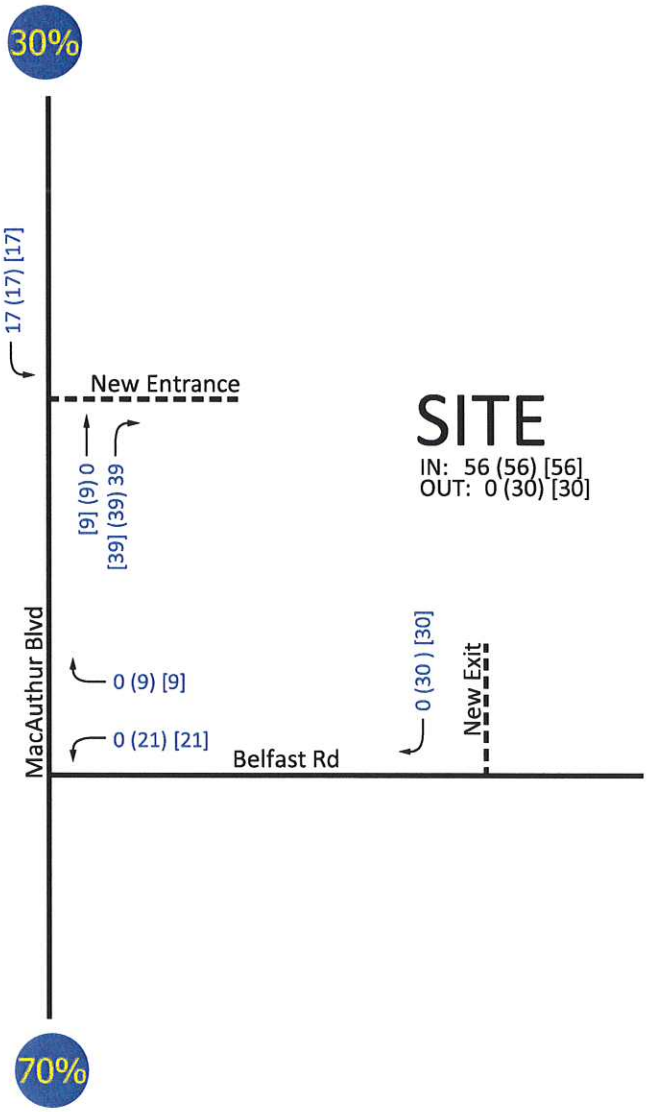
EXHIBIT 6
TRIP GENERATION
FOR SUBJECT SITE



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NOT TO SCALE

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR
[00] - WEEKEND PEAK HOUR

EXHIBIT 7
TRIP ASSIGNMENT FOR SUBJECT SITE

myc, 140615_rockwood manor\initial\ex.dwg-stn, f10/2/2014

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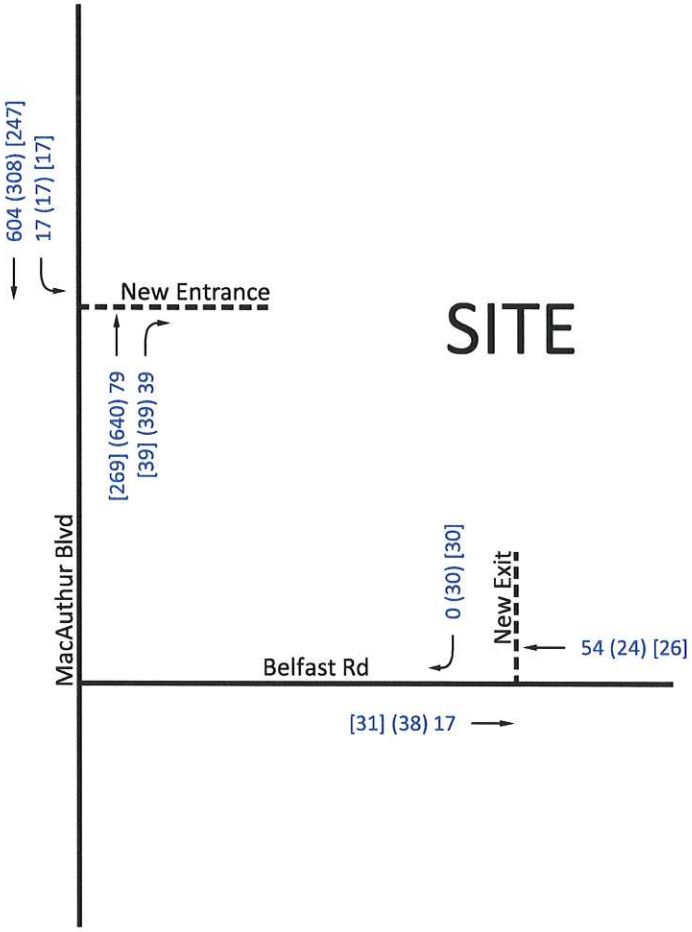
Since 1985



NOT TO SCALE

00 - MORNING PEAK HOUR
(00) - EVENING PEAK HOUR
[00] - WEEKEND PEAK HOUR

EXHIBIT 8
TOTAL PEAK HOUR TRAFFIC VOLUMES

myc, 140615_rockwood manor\initial\ex.dwg-tot, f10/2/2014

CLV Analysis

Intersection	Total Traffic		
	AM Peak	PM Peak	Weekend Peak
	LOS / CLV	LOS / CLV	LOS / CLV
MacArthur Blvd & New Entrance	A / 621	A / 696	A / 325
Belfast Rd & New Exit	A / 54	A / 54	A / 56

HCM Two-Lane Highway Analysis

Highway Segment	Total Traffic		
	AM Peak	PM Peak	Weekend Peak
	V/C	V/C	V/C
MacAuthur Blvd			
from Belfast Rd/Site Entrance	0.41	0.46	0.21
North of Site Entrance	0.42	0.43	0.18
Belfast Rd			
From Site Exit to MacAuthur Blvd	0.04	0.04	0.04

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EXHIBIT 9
RESULTS OF INTERSECTION
CAPACITY ANALYSES

APPENDIX A

Traffic Counts

The Traffic Group, Inc.
9900 Franklin Square Drive Suite H
Baltimore, MD 21236
(800)583-8411

MacArthur Blvd
North of Belfast Road
Montgomery County, Maryland

Site Code: 000000100082
Station ID: 0000000ROCK2

Latitude: 0' 0.000 Undefined

Start	16-Jun-14		Tue		Wed		Thu		Fri		Weekday Average		Sat		Sun	
Time	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	*	*	*	*	*	*	6	3	10	4	8	4	12	17	26	8
01:00	*	*	*	*	*	*	6	1	7	4	6	2	7	2	7	6
02:00	*	*	*	*	*	*	1	4	2	4	2	4	6	3	6	4
03:00	*	*	*	*	*	*	3	2	1	1	2	2	2	0	5	3
04:00	*	*	*	*	*	*	4	12	0	11	2	12	4	5	2	4
05:00	*	*	*	*	*	*	11	72	12	67	12	70	11	11	9	18
06:00	*	*	*	*	*	*	37	334	32	259	34	296	22	33	22	29
07:00	*	*	*	*	*	*	69	**648**	79	**490**	74	**569**	63	51	48	44
08:00	*	*	*	*	*	*	110	579	126	408	118	494	92	77	79	71
09:00	*	*	*	*	*	*	117	311	127	254	122	282	132	116	155	97
10:00	*	*	*	*	*	*	127	142	133	160	130	151	123	115	**214**	133
11:00	*	*	*	*	*	*	**139**	125	**162**	154	**150**	140	**141**	**136**	163	**157**
12:00 PM	*	*	*	*	*	*	121	141	201	162	161	152	146	131	245	233
01:00	*	*	*	*	141	153	137	132	257	164	178	150	**150**	148	**255**	216
02:00	*	*	*	*	256	131	242	149	358	167	285	149	150	140	229	208
03:00	*	*	*	*	473	129	456	134	509	225	479	163	125	148	173	**254**
04:00	*	*	*	*	**625**	166	583	201	**579**	**317**	**596**	228	131	167	194	244
05:00	*	*	*	*	619	**282**	**600**	**284**	567	303	595	**290**	124	**176**	182	202
06:00	*	*	*	*	515	178	553	158	295	202	454	179	120	128	113	143
07:00	*	*	*	*	181	93	337	72	144	112	221	92	83	95	76	76
08:00	*	*	*	*	117	73	136	66	115	84	123	74	73	68	101	95
09:00	*	*	*	*	77	48	80	45	92	55	83	49	66	44	59	41
10:00	*	*	*	*	43	15	55	14	65	32	54	20	55	27	40	18
11:00	*	*	*	*	32	7	28	9	26	14	29	10	51	21	20	9
Total	0	0	0	0	3079	1275	3958	3638	3899	3653	3918	3582	1889	1859	2423	2313
Day	0		0		4354		7596		7552		7500		3748		4736	
AM Peak							11:00	07:00	11:00	07:00	11:00	07:00	11:00	11:00	10:00	11:00
Vol.							139	648	162	490	150	569	141	136	214	157
PM Peak					16:00	17:00	17:00	17:00	16:00	16:00	16:00	17:00	13:00	17:00	13:00	15:00
Vol.					625	282	600	284	579	317	596	290	150	176	255	254

The Traffic Group, Inc.
9900 Franklin Square Drive Suite H
Baltimore, MD 21236
(800)583-8411

MacArthur Blvd
North of Belfast Road
Montgomery County, Maryland

Site Code: 000000100082
Station ID: 0000000ROCK2

Latitude: 0' 0.000 Undefined

Start	23-Jun-14		Tue		Wed		Thu		Fri		Weekday Average		Sat		Sun	
Time	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	9	4	*	*	*	*	*	*	*	*	9	4	*	*	*	*
01:00	3	6	*	*	*	*	*	*	*	*	3	6	*	*	*	*
02:00	3	3	*	*	*	*	*	*	*	*	3	3	*	*	*	*
03:00	0	1	*	*	*	*	*	*	*	*	0	1	*	*	*	*
04:00	1	14	*	*	*	*	*	*	*	*	1	14	*	*	*	*
05:00	17	80	*	*	*	*	*	*	*	*	17	80	*	*	*	*
06:00	36	354	*	*	*	*	*	*	*	*	36	354	*	*	*	*
07:00	68	**574**	*	*	*	*	*	*	*	*	68	**574**	*	*	*	*
08:00	135	538	*	*	*	*	*	*	*	*	135	538	*	*	*	*
09:00	125	299	*	*	*	*	*	*	*	*	125	299	*	*	*	*
10:00	103	147	*	*	*	*	*	*	*	*	103	147	*	*	*	*
11:00	**159**	137	*	*	*	*	*	*	*	*	**159**	137	*	*	*	*
12:00 PM	**156**	**130**	*	*	*	*	*	*	*	*	**156**	**130**	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	815	2287	0	0	0	0	0	0	0	0	815	2287	0	0	0	0
Day	3102		0		0		0		0		3102		0		0	
AM Peak	11:00	07:00									11:00	07:00				
Vol.	159	574									159	574				
PM Peak	12:00	12:00									12:00	12:00				
Vol.	156	130									156	130				

Comb. Total	3102	0	4354	7596	7552	10602	3748	4736

ADT ADT 6,202 AADT 6,202

The Traffic Group, Inc.
9900 Franklin Square Drive Suite H
Baltimore, MD 21236
(800)583-8411

Belfast Road
East of MacArthur Blvd
Montgomery County, Maryland

Site Code: 000000102043
Station ID: 0000000ROCK1

Latitude: 0' 0.000 Undefined

Start	16-Jun-14		Tue		Wed		Thu		Fri		Weekday Average		Sat		Sun	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	*	*	*	*	1	0	2	0	2	0	6	0	5	0
01:00	*	*	*	*	*	*	0	0	0	1	0	0	0	3	2	4
02:00	*	*	*	*	*	*	1	0	1	0	1	0	0	0	2	1
03:00	*	*	*	*	*	*	1	1	0	0	0	0	1	0	2	2
04:00	*	*	*	*	*	*	0	1	0	1	0	1	0	2	0	2
05:00	*	*	*	*	*	*	0	5	3	11	2	8	2	1	1	1
06:00	*	*	*	*	*	*	5	19	2	14	4	16	1	6	0	2
07:00	*	*	*	*	*	*	10	38	16	34	13	36	4	18	4	10
08:00	*	*	*	*	*	*	21	**46**	13	**61**	17	**54**	10	21	6	16
09:00	*	*	*	*	*	*	25	35	17	30	21	32	12	30	12	32
10:00	*	*	*	*	*	*	21	31	18	21	20	26	13	**31**	10	**35**
11:00	*	*	*	*	*	*	**27**	35	**27**	31	**27**	33	**17**	24	**31**	26
12:00 PM	*	*	*	*	*	*	31	30	31	31	31	30	36	29	23	25
01:00	*	*	*	*	**71**	49	25	**32**	25	21	**40**	34	35	**31**	25	16
02:00	*	*	*	*	25	**78**	27	26	32	**41**	28	**48**	21	22	26	28
03:00	*	*	*	*	39	21	33	30	40	33	37	28	31	30	30	25
04:00	*	*	*	*	25	30	25	22	35	27	28	26	35	29	**35**	25
05:00	*	*	*	*	39	21	35	25	**41**	25	38	24	**44**	22	25	**32**
06:00	*	*	*	*	42	22	**36**	22	36	25	38	23	31	22	32	15
07:00	*	*	*	*	41	20	35	11	26	16	34	16	17	19	21	20
08:00	*	*	*	*	27	14	30	15	24	8	27	12	23	17	33	14
09:00	*	*	*	*	19	6	21	5	19	12	20	8	22	17	23	14
10:00	*	*	*	*	13	4	16	5	24	5	18	5	17	10	11	8
11:00	*	*	*	*	3	4	7	5	2	1	4	3	10	8	5	1
Total	0	0	0	0	344	269	433	439	434	449	450	463	388	392	364	354
Day	0		0		613		872		883		913		780		718	
AM Peak							11:00	08:00	11:00	08:00	11:00	08:00	11:00	10:00	11:00	10:00
Vol.							27	46	27	61	27	54	17	31	31	35
PM Peak					13:00	14:00	18:00	13:00	17:00	14:00	13:00	14:00	17:00	13:00	16:00	17:00
Vol.					71	78	36	32	41	41	40	48	44	31	35	32

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East of MacArthur Blvd
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Site Code: 000000102043
Station ID: 0000000ROCK1

Latitude: 0' 0.000 Undefined

Start	23-Jun-14		Tue		Wed		Thu		Fri		Weekday Average		Sat		Sun	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	3	2	*	*	*	*	*	*	*	*	3	2	*	*	*	*
01:00	0	0	*	*	*	*	*	*	*	*	0	0	*	*	*	*
02:00	1	0	*	*	*	*	*	*	*	*	1	0	*	*	*	*
03:00	0	0	*	*	*	*	*	*	*	*	0	0	*	*	*	*
04:00	0	2	*	*	*	*	*	*	*	*	0	2	*	*	*	*
05:00	1	8	*	*	*	*	*	*	*	*	1	8	*	*	*	*
06:00	3	18	*	*	*	*	*	*	*	*	3	18	*	*	*	*
07:00	15	44	*	*	*	*	*	*	*	*	15	44	*	*	*	*
08:00	14	**57**	*	*	*	*	*	*	*	*	14	**57**	*	*	*	*
09:00	16	36	*	*	*	*	*	*	*	*	16	36	*	*	*	*
10:00	20	29	*	*	*	*	*	*	*	*	20	29	*	*	*	*
11:00	**28**	22	*	*	*	*	*	*	*	*	**28**	22	*	*	*	*
12:00 PM	**24**	**28**	*	*	*	*	*	*	*	*	**24**	**28**	*	*	*	*
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
07:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
08:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
09:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
10:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Total	125	246	0	0	0	0	0	0	0	0	125	246	0	0	0	0
Day	371		0		0		0		0		371		0		0	
AM Peak	11:00	08:00									11:00	08:00				
Vol.	28	57									28	57				
PM Peak	12:00	12:00									12:00	12:00				
Vol.	24	28									24	28				

Comb. Total	371	0	613	872	883	1284	780	718

ADT ADT 842 AADT 842

APPENDIX B

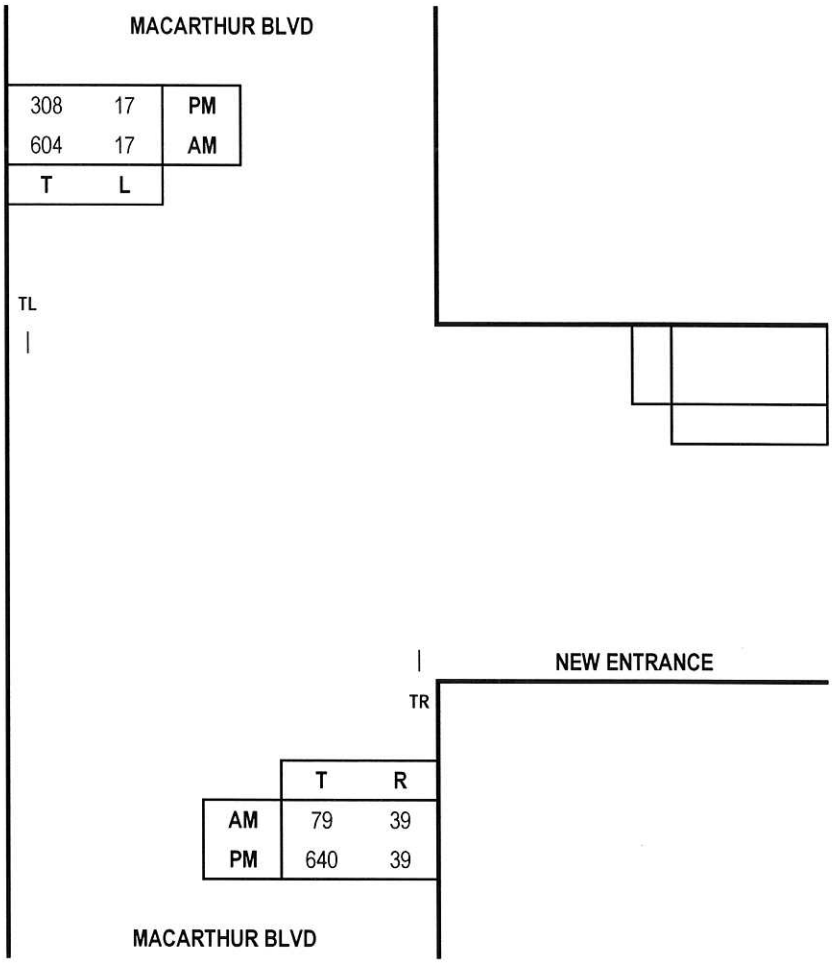
Capacity Analysis Worksheets

CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: New Entrance
N/S Road: Macarthur Blvd
Conditions: Total Traffic

Date of Count:
Day of Count:
Analyst: Ming-Yu Chien



Capacity Analysis

Morning Peak Hour							
	Thru Volumes			+ Opposing Lefts			AM
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
WB	0	0.00	0				0
NB	118	1.00	118	17	1.00	17	621
SB	621	1.00	621				
						CLV TOTAL=	621

Evening Peak Hour							
	Thru Volumes			+ Opposing Lefts			PM
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
WB	0	0.00	0				0
NB	679	1.00	679	17	1.00	17	696
SB	325	1.00	325				
						CLV TOTAL=	696

Scenario ID - TOT1

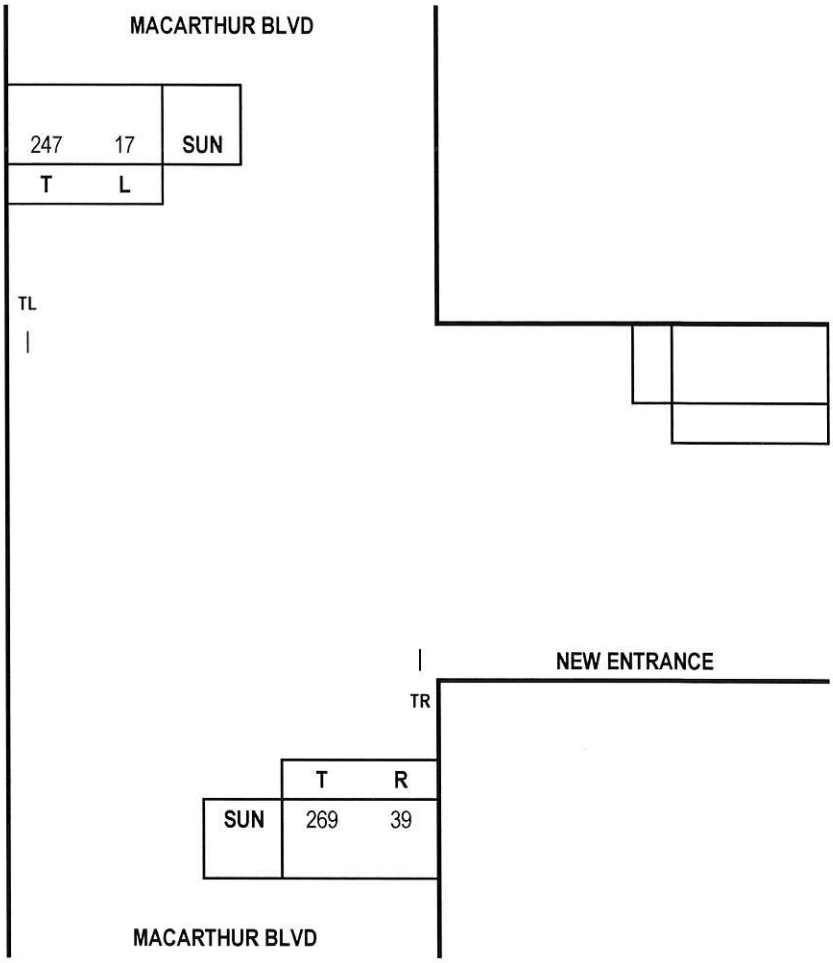
CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: New Entrance
N/S Road: Macarthur Blvd
Conditions: Total Traffic

Date of Count:
Day of Count:
Analyst: Ming-Yu Chien

Peak:



Capacity Analysis

Weekend Peak Hour							
	Thru Volumes			+ Opposing Lefts			SUN
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
WB	0	0.00	0				0
NB	308	1.00	308	17	1.00	17	325
SB	264	1.00	264				
						CLV TOTAL=	325

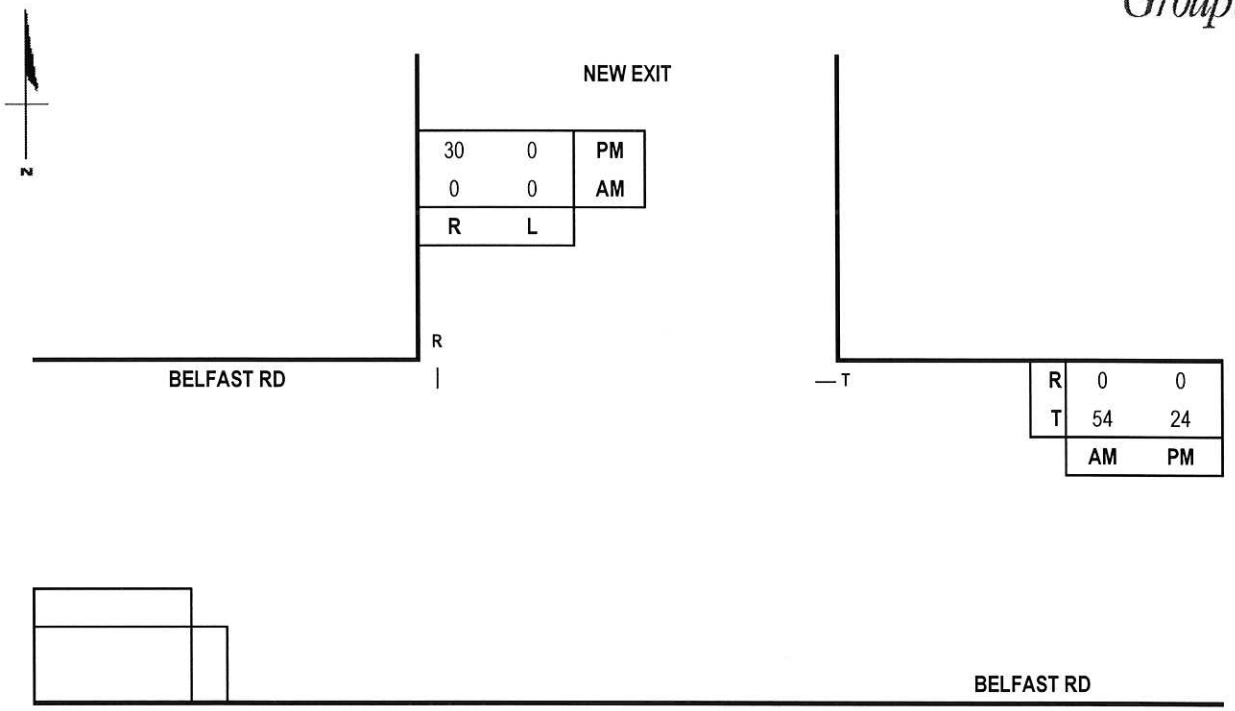
Scenario ID - TOT1

CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: Belfast Rd
N/S Road: New Exit
Conditions: Total Traffic

Date of Count:
Day of Count:
Analyst: Ming-Yu Chien



Capacity Analysis

Morning Peak Hour							
	Thru Volumes			+ Opposing Lefts			AM
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
SB	0	1.00	0				0
WB	54	1.00	54	0	0.00	0	54
						CLV TOTAL=	54

Evening Peak Hour							
	Thru Volumes			+ Opposing Lefts			PM
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
SB	30	1.00	30				30
WB	24	1.00	24	0	0.00	0	24
						CLV TOTAL=	54

Scenario ID - TOT2

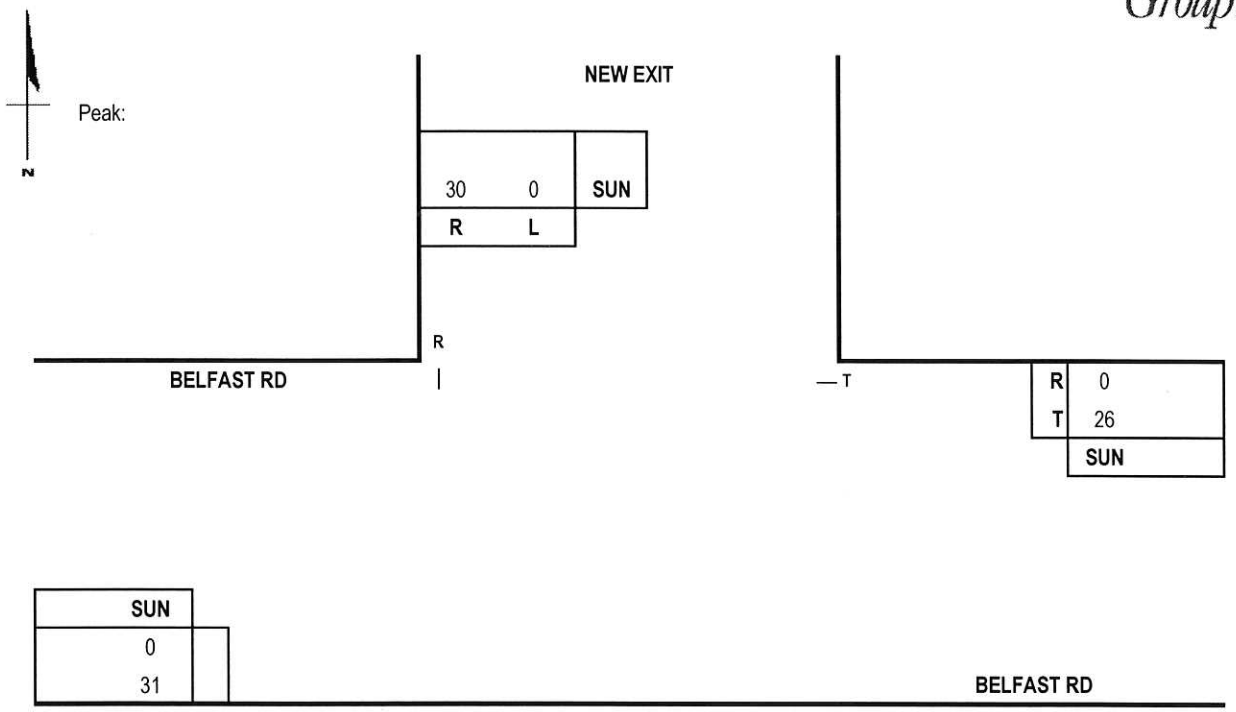
CRITICAL LANE VOLUME (CLV) METHODOLOGY

for Montgomery County

E/W Road: Belfast Rd
N/S Road: New Exit
Conditions: Total Traffic

Date of Count:
Day of Count:
Analyst: Ming-Yu Chien

The Traffic Group®



Capacity Analysis

Weekend Peak Hour							
	Thru Volumes			+ Opposing Lefts			SUN
Dir	VOL	x LUF	= Total	VOL	x LUF	= Total	CLV
SB	30	1.00	30				30
WB	26	1.00	26	0	0.00	0	26
					CLV TOTAL=		56

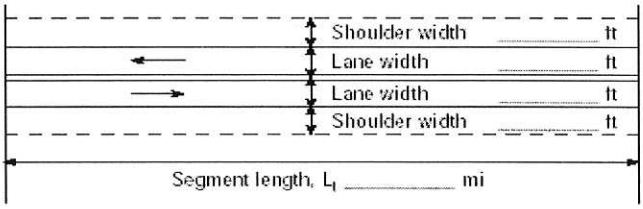
Scenario ID - TOT2

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Belfast Rd/Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*AM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *604* veh/h

Opposing direction vol., V_o *118* veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.1*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*690*	*139*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*32.9 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*686*	*135*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*55.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*26.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*77.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.41*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*17*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*60*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.5*

Notes

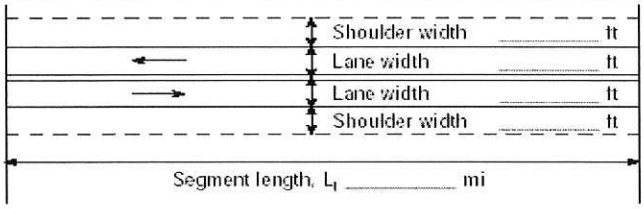
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Belfast Rd/Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*PM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *679* veh/h

Opposing direction vol., V_o *308* veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.1*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.990*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*775*	*354*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.0 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*30.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*772*	*352*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d{}^b})$	*63.4*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*28.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*83.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.46*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*19*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*68*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.6*

Notes

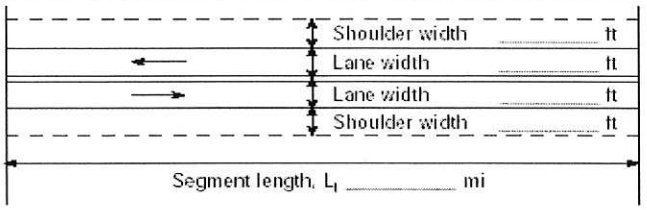
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Belfast Rd/Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*Weekend Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *308*veh/h

Opposing direction vol., V_o *247*veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.2*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)$ $v_i=V_i/(PHF*f_{HV}*f_G)$	*354*	*291*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*34.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)=V_i/(PHF*f_{HV}*f_G)$	*352*	*282*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*36.9*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*53.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*66.6*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.21*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*9*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*31*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.3*

Notes

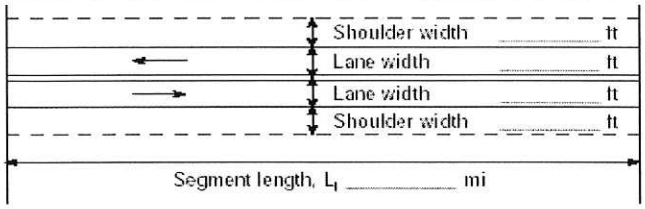
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*North of Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*AM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *621* veh/h

Opposing direction vol., V_o *79* veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.1*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*709*	*93*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*33.8 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*706*	*90*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*56.3*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*21.9*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*75.7*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1,700$	*0.42*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*18*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*62*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.5*

Notes

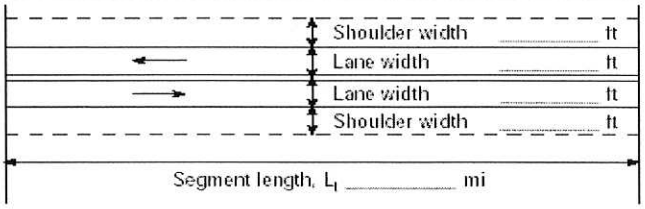
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*North of Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*PM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *640* veh/h

Opposing direction vol., V_o *325* veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.1*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.990*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)$ $v_i=V_i/(PHF*f_{HV}*f_G)$	*731*	*373*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.9 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*31.0 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)=V_i/(PHF*f_{HV}*f_G)$	*727*	*371*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*61.6*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*31.1*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*82.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*D*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.43*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*18*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*64*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.6*

Notes

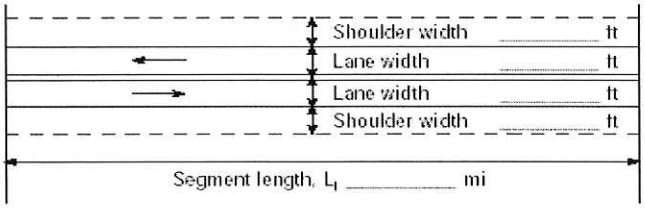
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If $v_i(v_d$ or $v_o) >=1{,}700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*MacAuthur Blvd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*North of Entrance*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*Weekend Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *269*veh/h

Opposing direction vol., V_o *264*veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.2*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.990*	*0.990*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)$ $v_i=V_i/(PHF*f_{HV}*f_G)$	*309*	*303*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*2.6 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*3.3 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*42.4 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*34.3 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], $v_i(pc/h)=V_i/(PHF*f_{HV}*f_G)$	*307*	*302*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*33.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*56.3*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*62.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*C*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.18*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*8*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*27*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.2*

Notes

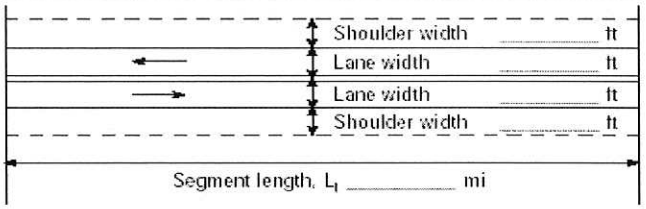
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If $v_i(v_d$ or $v_o) >=1{,}700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*Belfast Rd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Site Exit/MacAuthur Blvd*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*AM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *54* veh/h

Opposing direction vol., V_o *17* veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.966*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*64*	*20*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*4.2 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*40.8 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*37.7 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)$=V_i/(PHF*f_{HV}*f_G)$	*62*	*19*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*7.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*48.2*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*44.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.04*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)$=0.25L_t(V/PHF)$	*2*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)$=V*L_t$	*5*
Peak 15-min total travel time, TT_{15}(veh-h)$=VMT_{15}/ATS$	*0.1*

Notes

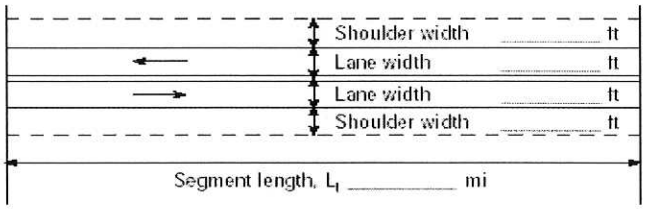
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*Belfast Rd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Site Exit/MacAuthur Blvd*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*PM Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



Analysis direction vol., V_d *54*veh/h

Opposing direction vol., V_o *38*veh/h

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.966*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*64*	*45*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*4.2 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*40.8 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*37.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*62*	*43*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*7.5*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*53.4*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*39.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*A*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.04*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*2*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*5*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.1*

Notes

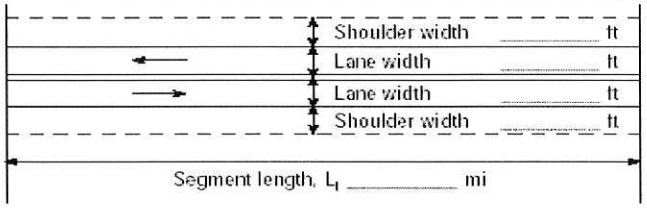
1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*RH*	Highway / Direction of Travel	*Belfast Rd*
Agency or Company	*The Traffic Grop, Inc.*	From/To	*Site Exit/MacAuthur Blvd*
Date Performed	*7/3/2014*	Jurisdiction	*Montgomery Couny, MD*
Analysis Time Period	*Weekend Peak*	Analysis Year	*Total*

Project Description: *Rockwood Manor*

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.88*

No-passing zone *100%*

% Trucks and Buses , P_T *5 %*

% Recreational vehicles, P_R *5%*

Access points/ *mi* *0*

Analysis direction vol., V_d *56*veh/h

Opposing direction vol., V_o *31*veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	*1.7*	*1.7*
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.966*	*0.966*
Grade adjustment factor [1], f_G (Exhibit 20-7 or 20-13)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV}*f_G)$	*66*	*36*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed[3], S_{FM}	*mi/h*	Base free-flow speed[3], $BFFS_{FM}$	*45.0 mi/h*
Observed volume[3], V_f	veh/h	Adj. for lane width and shoulder width,[3] f_{LS}(Exh 20-5)	*4.2 mi/h*
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$	*mi/h*	Adj. for access points[3], f_A (Exhibit 20-5)	*0.0 mi/h*
Adjustment for no-passing zones, f_{np} (Exhibit 20-19)	*2.4 mi/h*	Free-flow speed, FFS_d $(FSS=BFFS-f_{LS}-f_A)$	*40.8 mi/h*
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$	*37.6 mi/h*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 20-10 or 20-16)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.995*	*0.995*
Grade adjustment factor[1], f_G (Exhibit 20-8 or 20-14)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h)=$V_i/(PHF*f_{HV}*f_G)$	*64*	*35*
Base percent time-spent-following[4], $BPTSF(\%)=100(1-e^{av_d^b})$	*7.7*	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	*51.2*	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	*40.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	*B*
Volume to capacity ratio, $v/c=V_p/1{,}700$	*0.04*
Peak 15-min veh-miles of travel, VMT_{15} (veh- *mi*)=$0.25L_t(V/PHF)$	*2*
Peak-hour vehicle-miles of travel, VMT_{60}(veh- *mi*)=$V*L_t$	*6*
Peak 15-min total travel time, TT_{15}(veh-h)=VMT_{15}/ATS	*0.1*

Notes

1. If the highway is extended segment (level) or rolling terrain, fG=1.0 .
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.