June 14, 2013

Preliminary Traffic Assessment

AMBERLEY GREEN SITE

THE KLEINGERS GROUP

6305 Centre Park Drive
West Chester, OH 45069
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This preliminary traffic assessment was prepared to assess anticipated traffic conditions associated with the proposed Amberley Green mixed use development located at the former site of the Crest Hills Country Club in the southwest corner of the intersection of Galbraith Road and Ridge Road. For this assessment, it was assumed that the development will consist of the following land uses:

- 180 Residential Condominium Units
- 20,000 square feet of Retail
- 235,000 square feet of Office Space

The proposed development is to have access points on both Galbraith Road and Ridge Road. A project location map is included as Figure A and a conceptual site plan is included in Appendix A.

Galbraith Road and Ridge Road are both classified as Minor Arterial roads on the Ohio Department of Transportation's functional classification maps. Both roadways are generally two lane roads with speed limits of 35 mph. Left turn lanes are provided on each approach to the intersection of Galbraith Road and Ridge Road.

The focus of this assessment is primarily to assess the expected traffic operations at the proposed site access points and within the project site. This assessment included the collection of turning movement count data at the intersection of Ridge Road and Fairhaven Lane on Wednesday, May 29, 2013 for traffic analyses at the proposed site access on Ridge Road. Average daily traffic (ADT) count data was also obtained from the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) for Ridge Road. This ADT data was converted to peak hour counts using widely accepted assumptions. The collected traffic count data is shown in Appendix B and is illustrated on the surrounding roadway system in Figure B.

Observations conducted in the area revealed high traffic volumes on both Galbraith Road and Ridge Road during peak traffic times. During the afternoon peak hour, traffic on the northbound approach of Ridge Road queues from the traffic signal on Galbraith Road through the proposed site drive on Ridge Road. This queuing, combined with the high traffic volumes, makes it extremely difficult for motorists to turn left from the existing site driveway onto Ridge Road, even with just the existing traffic volumes. Significant queuing was also observed on the other approaches to this intersection. This queuing is an indicator that the traffic demand exceeds the available capacity at this intersection.

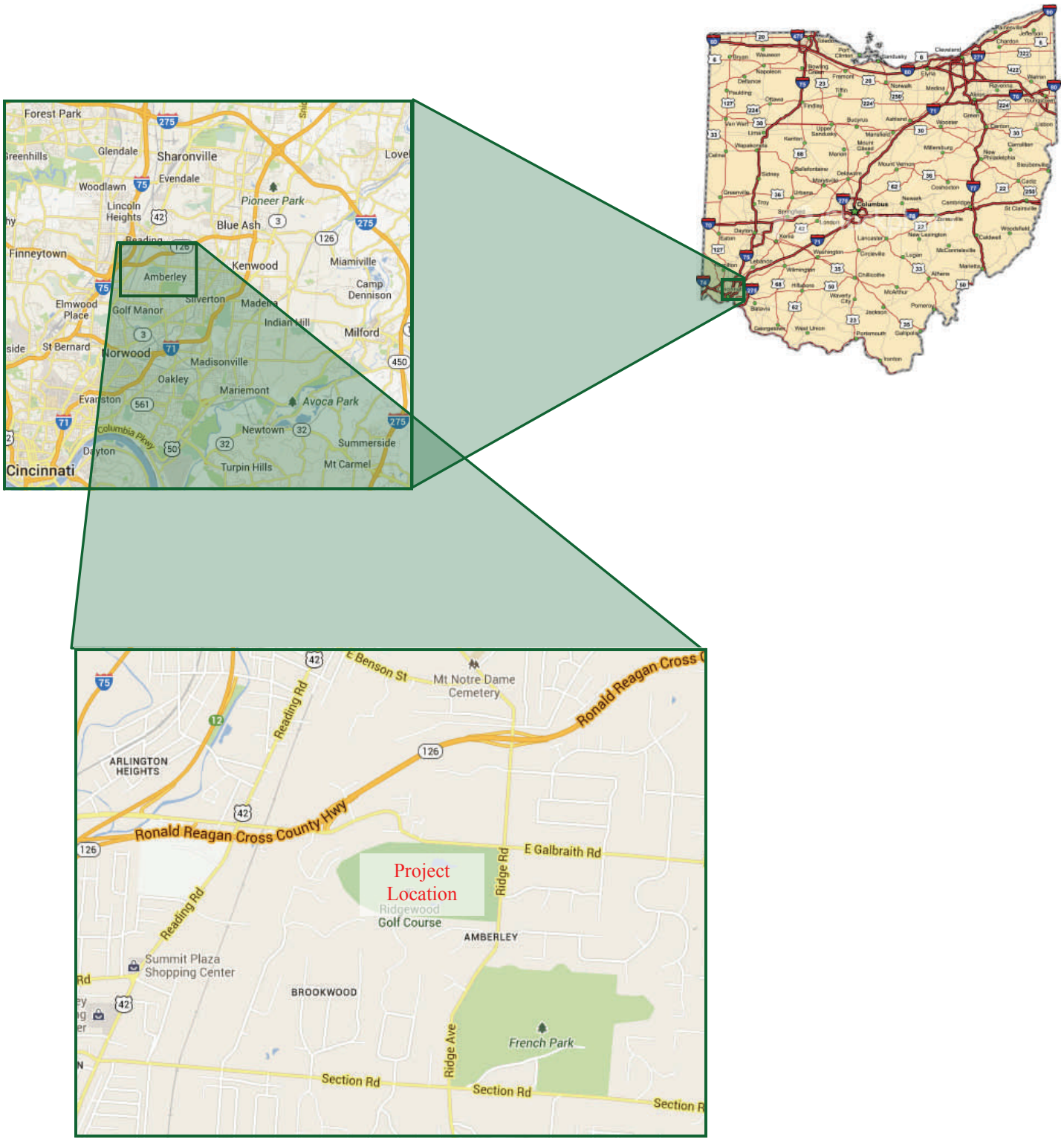


Figure A—Project Location Map

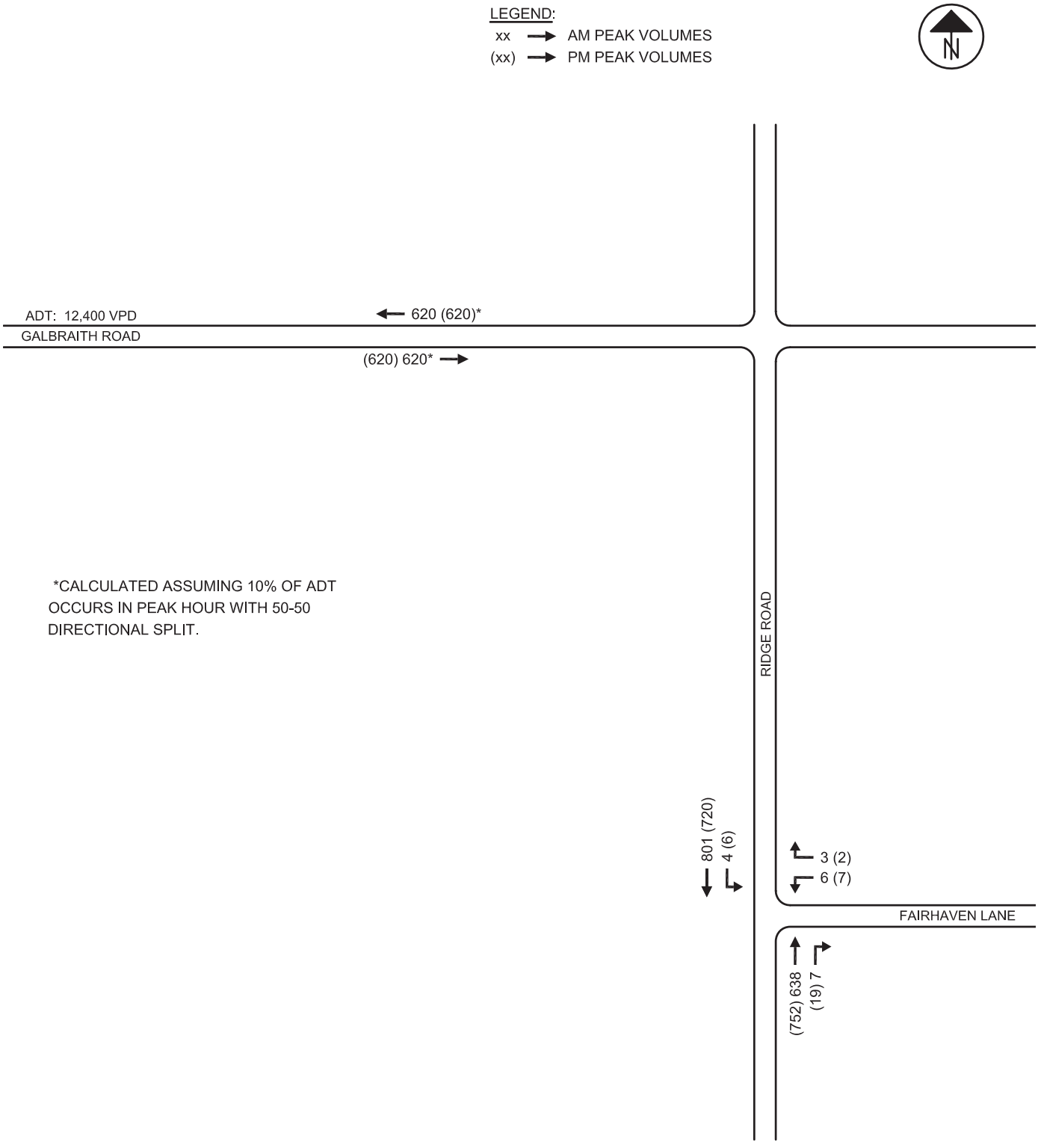


Figure B—Counted Traffic Volumes

Site generated traffic was estimated for the proposed site using the data and methodologies outlined in the Institute of Transportation Engineers *Trip Generation* publication. The site generated trip calculations are shown in Table A.

CONDITION	AVERAGE RATE OR FITTED CURVE EQUATION	SITE-GENERATED TRIPS				
		ENTERING TRIPS		EXITING TRIPS		TOTAL
		PCT	NO.	PCT	NO.	TRIPS
Residential Condominium/Townhou	ITE Land Use Code:	230	X=	180	Dwelling Units	
Weekday Daily	*Ln(T) = 0.87 LN(X)+2.46*	50%	**537**	50%	**537**	**1,074**
Weekday A.M. Peak Hour (7-9am)	*Ln(T) = 0.80 LN(X)+0.26*	17%	**14**	83%	**69**	**83**
Weekday P.M. Peak Hour (4-6pm)	*Ln(T) = 0.82 LN(X)+0.32*	67%	**65**	33%	**32**	**97**
Shopping Center	ITE Land Use Code:	820	X=	20.0	1000 ft²	
Weekday Daily	*Ln(T) = 0.65 LN(X)+5.83*	50%	**1,193**	50%	**1,193**	**2,386**
Weekday A.M. Peak Hour	*Ln(T) = 0.61 LN(X)+2.24*	62%	**36**	38%	**22**	**58**
Weekday P.M. Peak Hour	*Ln(T) = 0.67 LN(X)+3.31*	48%	**98**	52%	**106**	**204**
General Office Building	ITE Land Use Code:	710	X=	235	1000 ft²	
Weekday Daily	*Ln(T) = 0.76 LN(X)+3.68*	50%	**1,257**	50%	**1,257**	**2,514**
Weekday AM Peak Hour	*Ln(T) = 0.80 LN(X)+1.57*	88%	**334**	12%	**45**	**379**
Weekday PM Peak Hour	*T = 1.12 X + 78.45*	17%	**58**	83%	**284**	**342**
Totals:						
	Weekday Daily		2,987		2,987	5,974
	Weekday A.M. Peak Hour (7-9am)		**384**		**136**	**520**
	Weekday P.M. Peak Hour (4-6pm)		**221**		**422**	**643**

Table A: Trip Generation Calculations

The site generated trips were distributed onto the surrounding roadway system based on estimated travel patterns to and from the project site. In distributing the site volumes, consideration was also given to the location of the specific destination within the site as well as existing congestion observed in the field (currently, traffic on northbound Ridge Road queues from the traffic signal at Galbraith Road beyond the proposed site drive on Ridge Road). Regionally, traffic was distributed as follows:

- 30% to and from the north on Ridge Road
- 20% to and from the south on Ridge Road
- 25% to and from the east on Galbraith Road
- 25% to and from the west on Galbraith Road

The distributed site-generated traffic volumes are shown in Figure C. Note that the intersection of Galbraith Road and Ridge Road was not analyzed as part of this study. Site generated trips are shown at this intersection for reference only. The site generated volumes were combined with the existing traffic volumes to obtain the total traffic volume, which are shown in Figure D.

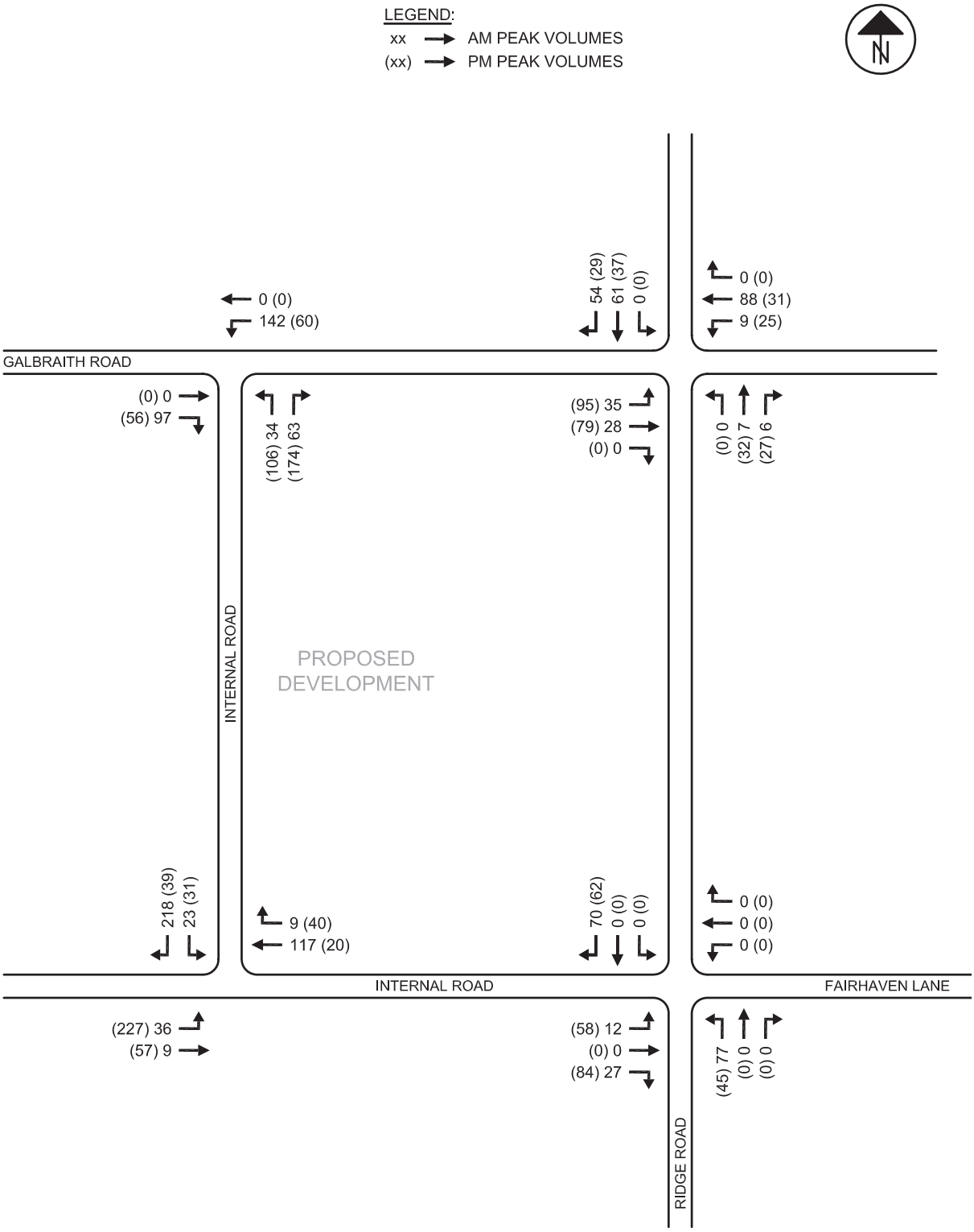


Figure C—Site-Generated Traffic Volumes,

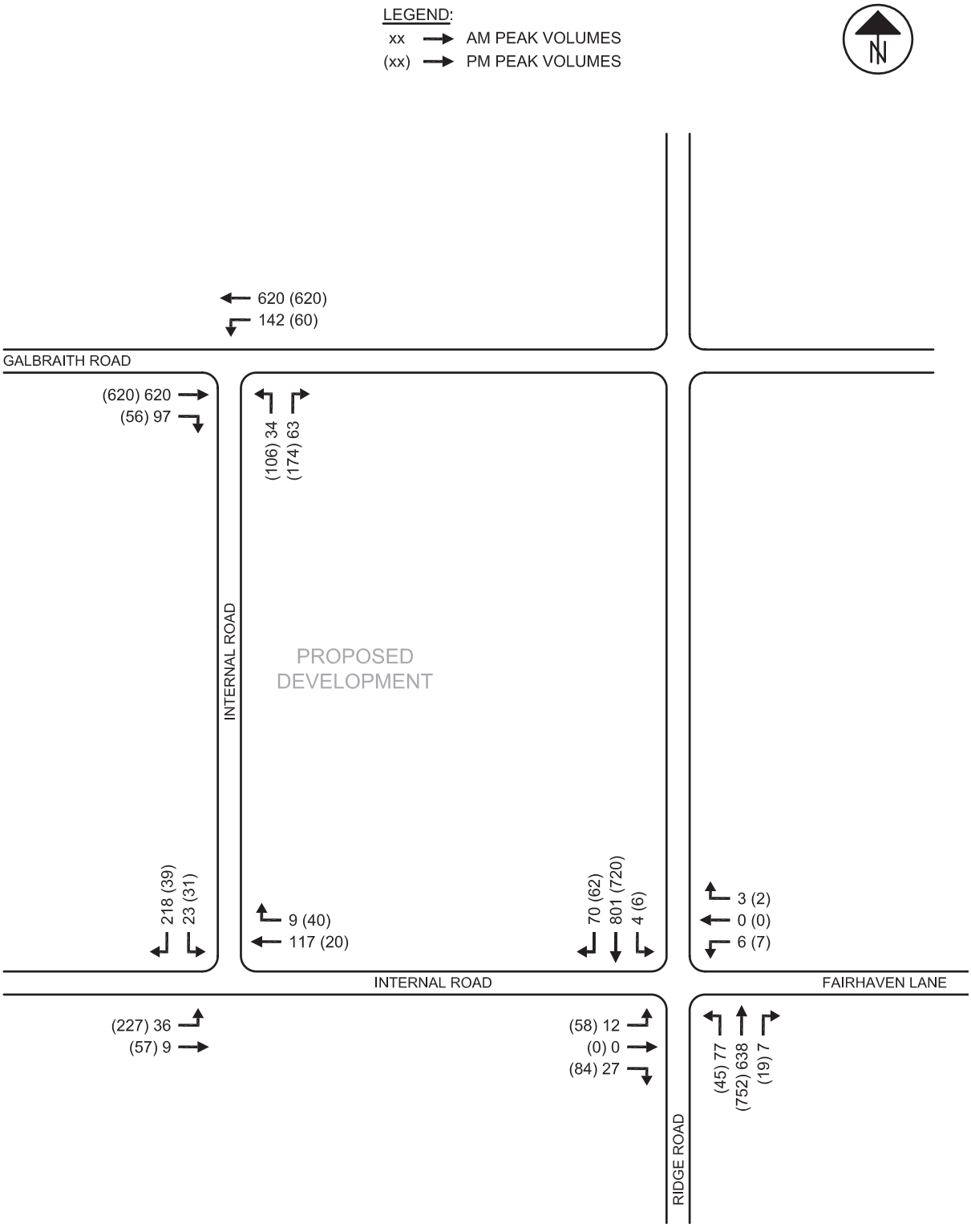


Figure D—Total Traffic Volumes

Turn lane warrant analyses and capacity analyses were performed using the total traffic volumes shown in Figure D. The results of the turn lane warrant analyses are summarized in Table B.

INTERSECTION	TURN MOVEMENT	TURNS (AM / PM)	ADVANCING VEHICLES (AM / PM)	OPPOSING VEHICLES (AM / PM)	WARRANTED ?
Galbraith at Site Access	WB Left	142/60	762/680	717/676	YES
	EB Right	97/56	717/676		YES
Ridge at Site Access	NB Left	77/45	715/797	781/782	YES
	SB Right	70/62	781/782		YES

Table B: Turn Lane Warrant Summary

According to the analyses, left and right turn lanes are expected to be warranted at both site access points on Galbraith Road and Ridge Road.

For the initial capacity analyses, it was assumed that the site driveways will be controlled by stop signs and that traffic on Galbraith Road and Ridge Road will not be required to stop. The results of the capacity analyses are summarized in Table C.

Intersection	Int. Control	Int. LOS*	Max v/c Ratio	Max LOS*	Movements w/ Unacceptable LOS
Galbraith Road at Site Access	TWSC		0.45/0.95	F/F	NBL
Ridge Road at Site Access	TWSC		0.22/1.03	F/F	EBL, WBL
Main Internal Intersection	TWSC		0.3/0.13	B/B	
Galbraith Road at Site Access	Roundabout	C/C	0.85/0.77	C/C	
Ridge Road at Site Access	Roundabout	D/C	0.96/0.88	E/D	SB approach (AM)
* AM / PM					

Table C: Capacity Analyses Summary

According to the analyses, poor levels of service (LOS) and high volume to capacity ratios are expected for traffic turning left out of the proposed development onto Galbraith Road and Ridge Road. As a result, it is expected that another type of traffic control will be needed in order for traffic to be able to safely and efficiently exit the development. Additional capacity analyses were performed assuming that both site drives will be controlled by roundabouts. According to the analyses, a roundabout at the site access point on Galbraith Road may function adequately, but a roundabout at the site access point on Ridge Road is expected to operate very near capacity (note that the volumes analyzed are current year volumes and do not consider potential additional background traffic growth).

In order for alternate traffic control methods at the site drives, such as a traffic signal or a roundabout, to be effective, it will be necessary to address the queuing that is occurring at the intersection of Galbraith Road and Ridge Road via improvements to capacity. A more thorough analysis of this intersection, using projected future year traffic volumes, will be required. The existing signal timings at this intersection should be evaluated to determine if improvements are possible. However, it is anticipated that roadway improvements, such as additional through travel lanes, may be needed to provide the needed capacity and will likely be very costly.

The analyses at the main internal site intersection indicate that it should function appropriately as a two-way stop controlled intersection.

When locating the site access points on Galbraith Road and Ridge Road, sight distance should be verified to ensure that adequate sight distance is provided.

Internal Site Recommendations

1. Adequate separation should be provided along the main site access drive between the secondary residential access drives and Galbraith Road. A separation distance of at least 250 feet should be considered but should be reevaluated based on the type of traffic control implemented at the intersection of Galbraith Road and the site access drive.
2. Adequate separation should be provided along the main site access drive between the secondary retail access drives and Ridge Road. A separation distance of at least 250 feet should be considered but should be reevaluated based on the type of traffic control implemented at the intersection of Ridge Road and the site access drive.
3. Where possible, the secondary residential access drives should be aligned directly opposite each other along the main site access drive.
4. To provide for a more pedestrian friendly environment between the retail land uses, it is suggested that the buildings be grouped together and that parking be provided on the perimeter.
5. If the main site access drive is routed through the center of the proposed retail development, a crosswalk(s) with adequate signing and markings should be provided.

APPENDIX A
Conceptual Site Plan

Site Plan Scale: 1" = 100'

0 50 100 200 400 Feet

Site Development Diagram

Amberley Green
Walnut Development Group | Mixed-Use Liveable Community

MSA Architects

March 5, 2013

APPENDIX B
Traffic Count Data

FREELAND AVE W OF GRANDIN RD						800						

Hamilton County	Average Annual Daily Traffic (AADT)											
Roadway Location	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
FREELAND AVE W OF GRANDIN RD						800						
FREEMAN AVE N OF MEHRING WY			3200								3893	
FREEMAN AVE N OF YORK ST						2000	1800					
FREEMAN AVE S OF YORK ST						2500						
FROLIC DR S OF GALBRAITH RD	800	600				700						
FROLIC DR S OF HAPPINESS WY	600											
FROOME AVE E OF WINTON RD		400				400						
FULTON DR W OF NASSAU ST	800											
FYFEE AVE S OF WESTWOOD NORTHERN BLVD				1800		600						
GALBRAITH RD E OF BLANCHETTA DR	11200											
GALBRAITH RD E OF BLUE ASH RD				1900		2100						
GALBRAITH RD E OF BLUEROCK RD	3600				4900							
GALBRAITH RD E OF BOBOLINK DR										11558		
GALBRAITH RD E OF CHEVIOT RD	8700		9800		10000	8900						
GALBRAITH RD E OF CLARA AVE					7200							
GALBRAITH RD E OF CLOVERNOOK AVE											10549	
GALBRAITH RD E OF DALY RD				14900						12684		
GALBRAITH RD E OF HAMILTON AVE (US-127)			20300									
GALBRAITH RD E OF I-75						12300						
GALBRAITH RD E OF KENWOOD RD	11600	11900		13100	11900	16300						9807
GALBRAITH RD E OF MIAMI AVE				4300								
GALBRAITH RD E OF NIEMAN DR				15500		13300						
GALBRAITH RD E OF PIPPIN RD			16800			11700						
GALBRAITH RD E OF REAGAN HWY (SR-126)		9800	12400									
GALBRAITH RD E OF RIDGE RD					12900				10880		9475	9280
GALBRAITH RD E OF VINE ST				21500								
GALBRAITH RD E OF WEXFORD AVE			12500									
GALBRAITH RD E OF WINTON RD	44100	34400		23200		23700						
GALBRAITH RD E OF WINTON RD		35200										
GALBRAITH RD E OF WOODBINE						26900						
GALBRAITH RD N OF R.R. HIGHWAY				15100								
GALBRAITH RD W OF BLANCHETTA DR	11500											
GALBRAITH RD W OF BLUE ASH RD				2200		2200						
GALBRAITH RD W OF BOBOLINK										11654		

Turning Movement Counts Summary Table

Kleingers & Associates
6305 Centre Park Drive, West Chester OH, 45069
513-779-7851

Location: Ridge Road at Fairhaven Lane

Date of Counts: Wednesday, May 29, 2013

Performed By: B. Scheck

AM	EB				WB Fairhaven				NB Ridge				SB Ridge			
	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED
7:00 to 7:15 am	0	0	0	0	1	0	0	0	0	83	0	0	0	149	0	0
7:15 to 7:30 am	0	0	0	0	1	0	2	0	0	132	0	0	0	159	0	0
7:30 to 7:45 am	0	0	0	0	1	0	0	0	0	166	0	0	1	208	0	0
7:45 to 8:00 am	0	0	0	0	1	0	0	0	0	180	1	0	2	208	0	0
8:00 to 8:15 am	0	0	0	0	2	0	0	0	0	150	4	0	0	180	0	0
8:15 to 8:30 am	0	0	0	0	2	0	3	0	0	142	2	0	1	205	0	0
8:30 to 8:45 am	0	0	0	0	1	0	5	0	0	132	2	0	0	155	0	0
8:45 to 9:00 am	0	0	0	0	1	0	1	0	0	127	3	0	1	193	0	0
AM Peak Hr Vol.	0	0	0	0	6	0	3	0	0	638	7	0	4	801	0	0
Peak Hr Factor					0.75		0.25			0.89	0.44		0.50	0.96		

PM	EB				WB Fairhaven				NB Ridge				SB Ridge			
	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED	LEFT	THRU	RIGHT	PED
4:00 to 4:15 pm	0	0	0	0	0	0	2	0	0	177	1	0	0	137	0	0
4:15 to 4:30 pm	0	0	0	0	0	0	0	0	0	176	2	0	0	139	0	0
4:30 to 4:45 pm	0	0	0	0	3	0	1	0	0	215	4	0	4	168	0	0
4:45 to 5:00 pm	0	0	0	0	1	0	0	0	0	163	3	0	1	170	0	0
5:00 to 5:15 pm	0	0	0	0	1	0	1	0	0	192	4	0	1	197	0	0
5:15 to 5:30 pm	0	0	0	0	2	0	0	0	0	182	8	0	0	185	0	0
5:30 to 5:45 pm	0	0	0	0	1	0	2	0	0	165	6	0	1	169	0	0
5:45 to 6:00 pm	0	0	0	0	1	0	2	0	0	139	2	1	1	180	0	0
PM Peak Hr Vol.	0	0	0	0	7	0	2	0	0	752	19	0	6	720	0	0
Peak Hr Factor					0.58		0.50			0.87	0.59		0.38	0.91		

Peak Hour Times: AM 7:30 to 8:30 PM 4:30 to 5:30

Heavy Vehicle Volumes

HV - AM	EB				WB Fairhaven				NB Ridge				SB Ridge			
	LEFT	THRU	RIGHT		LEFT	THRU	RIGHT		LEFT	THRU	RIGHT		LEFT	THRU	RIGHT	
7:00 to 7:15 am	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
7:15 to 7:30 am	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0
7:30 to 7:45 am	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0
7:45 to 8:00 am	0	0	0	0	0	0	0	0	0	2	1	0	1	8	0	0
8:00 to 8:15 am	0	0	0	0	1	0	0	0	0	2	0	0	0	3	0	0
8:15 to 8:30 am	0	0	0	0	0	0	0	0	0	1	0	0	0	9	0	0
8:30 to 8:45 am	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	0
8:45 to 9:00 am	0	0	0	0	0	0	0	0	0	5	0	0	0	12	0	0
AM Peak HV	0	0	0	0	1	0	0	0	0	6	1	0	1	25	0	0
% Peak HV					17%					1%	14%		25%	3%		

HV - PM	EB				WB Fairhaven				NB Ridge				SB Ridge			
	LEFT	THRU	RIGHT		LEFT	THRU	RIGHT		LEFT	THRU	RIGHT		LEFT	THRU	RIGHT	
4:00 to 4:15 pm	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
4:15 to 4:30 pm	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
4:30 to 4:45 pm	0	0	0	0	0	0	0	0	0	2	1	0	1	2	0	0
4:45 to 5:00 pm	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0
5:00 to 5:15 pm	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
5:15 to 5:30 pm	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
5:30 to 5:45 pm	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0
5:45 to 6:00 pm	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0
AM Peak HV	0	0	0	0	0	0	0	0	0	6	1	0	1	6	0	0
% Peak HV										1%	5%		17%	1%		

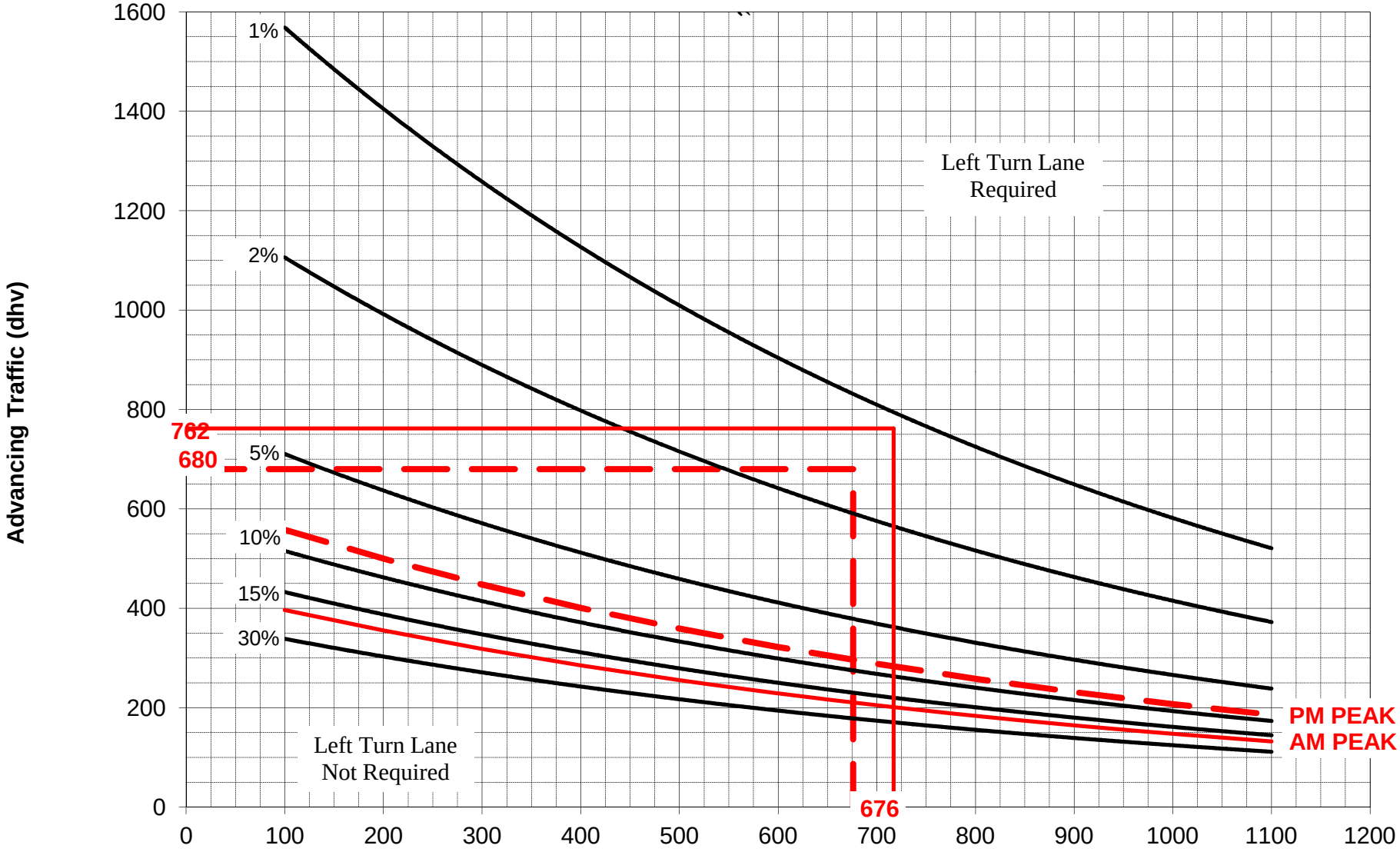
APPENDIX C
Turn Lane Warrants

2-Lane Highway Left Turn Lane Warrant (<=40MPH)

AM Peak: # Left Turns = 142; % Left Turns = 19%; WARRANTED

PM Peak: # Left Turns = 60; % Left Turns = 9%; WARRANTED

Volumes Analyzed: 2013
Amberley Green Traffic Analysis
Galbraith at Site Access

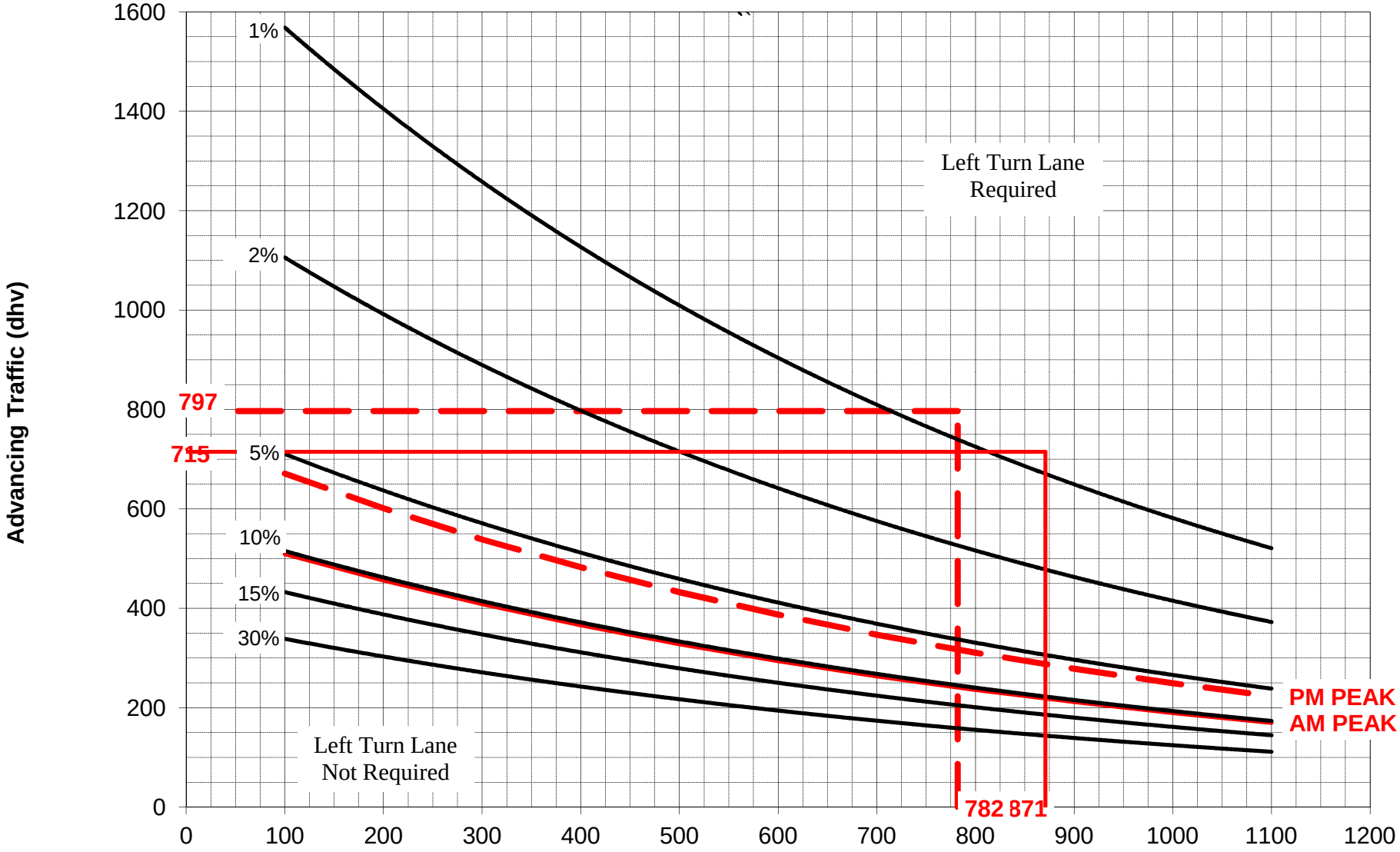


2-Lane Highway Left Turn Lane Warrant (<=40MPH)

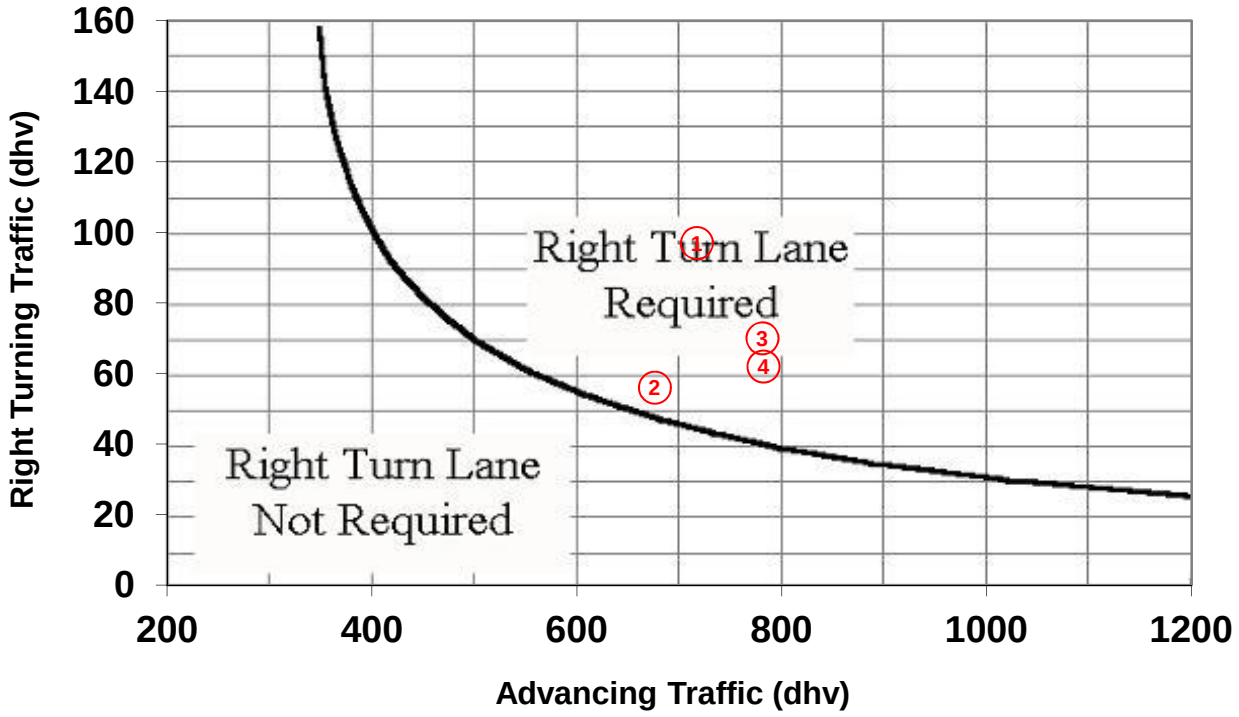
AM Peak: # Left Turns = 77; % Left Turns = 11%; WARRANTED

PM Peak: # Left Turns = 45; % Left Turns = 6%; WARRANTED

Volumes Analyzed: 2013
Amberley Green Traffic Analysis
Ridge at Site Access



2-Lane Highway Right Turn Lane Warrant
=< 40 mph or 70 kph Posted Speed



REQ	Intersection	Advancing Traffic Volume	Right Turning Traffic	Result
1	Galbraith at Site Access - AM	717	97	YES
2	Galbraith at Site Access - PM	676	56	YES
3	Ridge at Site Access - AM	781	70	YES
4	Ridge at Site Access - PM	782	62	YES
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

APPENDIX D
Capacity Analyses

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Galbraith at Site Access*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *Galbraith Road* | North/South Street: *Site Access*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*620*	*97*	*142*	*620*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*688*	*107*	*157*	*688*	*0*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*34*		*63*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*37*	*0*	*70*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*157*	*37*		*70*			
C (m) (veh/h)		*826*	*83*		*446*			
v/c		*0.19*	*0.45*		*0.16*			
95% queue length		*0.70*	*1.83*		*0.55*			
Control Delay (s/veh)		*10.4*	*79.4*		*14.6*			
LOS		*B*	*F*		*B*			
Approach Delay (s/veh)	--	--	*37.0*					
Approach LOS	--	--	*E*					

HCS+™ Version 5.6

Generated: 6/11/2013 3:08 PM

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Galbraith at Site Access*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *Galbraith Road* | North/South Street: *Site Access*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)		*620*	*56*	*60*	*620*	
Peak-Hour Factor, PHF	*1.00*	*0.90*	*0.90*	*0.90*	*0.90*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*0*	*688*	*62*	*66*	*688*	*0*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*1*	*1*	*1*	*0*
Configuration		*T*	*R*	*L*	*T*	
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*106*		*174*			
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*1.00*	*1.00*	*1.00*
Hourly Flow Rate, HFR (veh/h)	*117*	*0*	*193*	*0*	*0*	*0*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*L*	*L*		*R*			
v (veh/h)		*66*	*117*		*193*			
C (m) (veh/h)		*859*	*123*		*446*			
v/c		*0.08*	*0.95*		*0.43*			
95% queue length		*0.25*	*6.26*		*2.14*			
Control Delay (s/veh)		*9.5*	*135.8*		*19.1*			
LOS		*A*	*F*		*C*			
Approach Delay (s/veh)	--	--	*63.1*					
Approach LOS	--	--	*F*					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Ridge at Site Access*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *Ridge Road* | North/South Street: *Site Access*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*77*	*638*	*7*	*4*	*801*	*70*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*85*	*708*	*7*	*4*	*890*	*77*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*1*
Configuration	*L*		*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*12*	*0*	*27*	*6*	*0*	*3*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*13*	*0*	*30*	*6*	*0*	*3*
Percent Heavy Vehicles	*2*	*2*	*2*	*2*	*2*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*TR*	*L*		*TR*
v (veh/h)	*85*	*4*	*6*		*3*	*13*		*30*
C (m) (veh/h)	*712*	*885*	*49*		*432*	*58*		*342*
v/c	*0.12*	*0.00*	*0.12*		*0.01*	*0.22*		*0.09*
95% queue length	*0.40*	*0.01*	*0.39*		*0.02*	*0.76*		*0.29*
Control Delay (s/veh)	*10.7*	*9.1*	*88.5*		*13.4*	*84.2*		*16.5*
LOS	*B*	*A*	*F*		*B*	*F*		*C*
Approach Delay (s/veh)	--	--	*63.4*			*37.0*		
Approach LOS	--	--	*F*			*E*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Ridge at Site Access*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *Ridge Road* | North/South Street: *Site Access*

Intersection Orientation: *North-South* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*45*	*752*	*19*	*6*	*720*	*62*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*50*	*835*	*21*	*6*	*800*	*68*
Percent Heavy Vehicles	*2*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*1*
Configuration	*L*		*TR*	*L*	*T*	*R*
Upstream Signal		*0*			*0*	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*58*	*0*	*84*	*7*	*0*	*2*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*64*	*0*	*93*	*7*	*0*	*2*
Percent Heavy Vehicles	*2*	*2*	*2*	*2*	*2*	*2*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*TR*	*L*		*TR*
v (veh/h)	*50*	*6*	*7*		*2*	*64*		*93*
C (m) (veh/h)	*776*	*784*	*42*		*362*	*62*		*385*
v/c	*0.06*	*0.01*	*0.17*		*0.01*	*1.03*		*0.24*
95% queue length	*0.21*	*0.02*	*0.53*		*0.02*	*5.03*		*0.93*
Control Delay (s/veh)	*10.0*	*9.6*	*107.1*		*15.0*	*234.7*		*17.3*
LOS	*A*	*A*	*F*		*B*	*F*		*C*
Approach Delay (s/veh)	--	--	*86.7*			*105.9*		
Approach LOS	--	--	*F*			*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Main Internal Intersection*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *East West*	North/South Street: *North South*
Intersection Orientation: *East-West*	Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*36*	*9*			*117*	*9*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*40*	*10*	*0*	*0*	*130*	*10*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*23*		*218*
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*25*	*0*	*242*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*40*						*267*	
C (m) (veh/h)	*1456*						*900*	
v/c	*0.03*						*0.30*	
95% queue length	*0.08*						*1.25*	
Control Delay (s/veh)	*7.5*						*10.7*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--					*10.7*	
Approach LOS	--	--					*B*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*M. Nolt*
Agency/Co.	*The Kleingers Group*
Date Performed	*6/11/2013*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Main Internal Intersection*
Jurisdiction	
Analysis Year	*2013*

Project Description *Amberley Green*

East/West Street: *East West* | North/South Street: *North South*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*227*	*57*			*20*	*40*
Peak-Hour Factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*252*	*63*	*0*	*0*	*22*	*44*
Percent Heavy Vehicles	*0*	--	--	*2*	--	--
Median Type	*Undivided*					
RT Channelized			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)				*31*		*39*
Peak-Hour Factor, PHF	*0.90*	*1.00*	*0.90*	*0.90*	*1.00*	*0.90*
Hourly Flow Rate, HFR (veh/h)	*0*	*0*	*0*	*34*	*0*	*43*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Delay, Queue Length, and Level of Service

Approach	Eastbound	Westbound	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
v (veh/h)	*252*						*77*	
C (m) (veh/h)	*1549*						*592*	
v/c	*0.16*						*0.13*	
95% queue length	*0.58*						*0.45*	
Control Delay (s/veh)	*7.8*						*12.0*	
LOS	*A*						*B*	
Approach Delay (s/veh)	--	--				*12.0*		
Approach LOS	--	--				*B*		

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ROUNDABOUT REPORT

General Information		Site Information	
Analyst	*M. Nolt*	Intersection	*Galbraith at Site Access*
Agency or Co.	*The Kleingers Group*	E/W Street Name	*Galbraith Road*
Date Performed	*6/11/2013*	N/S Street Name	
Time Period	*AM Peak*	Analysis Year	*2013*
		Project ID	*Amberley Green*

Project Description:

Volume Adjustment and Site Characteristics

	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes(N)	*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*		*0*	*0*	*0*	
Volume (V), veh/h	*0*	*620*	*97*	*0*	*142*	*620*	*0*	*0*	*34*	*0*	*63*	*0*	*0*	*0*	*0*	*0*
Heavy Veh. Adj. (f_{HV}), %	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Peak Hour Factor (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*	*0.90*	*0.90*	*0.90*	*0.90*
No. of Pedestrians Crossing Entry	*0*				0				0				0			

Critical and Follow-Up Headway Adjustment

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*
Follow-Up Headway (sec)	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*

Flow Computations

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Circulating Flow (V_c), pc/h	*161*			*39*			*703*			*903*		
Exiting Flow (V_{ex}), pc/h	*774*			*742*			*0*			*271*		
Entry Flow (V_e), pc/h		*813*			*864*			*110*				
Entry Volume veh/h		*797*			*847*			*108*				

Capacity and v/c Ratios

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Capacity (c_{PCE}), pc/h		*962*			*1087*			*559*			*458*	
Capacity (c), veh/h		*943*			*1066*			*548*			*449*	
v/c Ratio (X)		*0.85*			*0.79*			*0.20*				

Delay and Level of Service

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		*24.8*			*19.0*			*9.2*				
Lane LOS		*C*			*C*			*A*				
Lane 95% Queue		*10.4*			*8.8*			*0.7*				
Approach Delay, s/veh	*24.84*			*18.96*			*9.16*					
Approach LOS, s/veh	*C*			*C*			*A*					
Intersection Delay, s/veh	*20.34*											
Intersection LOS	*C*											

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ROUNDABOUT REPORT

General Information		Site Information	
Analyst	*M. Nolt*	Intersection	*Galbraith at Site Access*
Agency or Co.	*The Kleingers Group*	E/W Street Name	
Date Performed	*6/11/2013*	N/S Street Name	
Time Period	*PM Peak*	Analysis Year	*2013*
		Project ID	*Amberley Green*

Project Description:

Volume Adjustment and Site Characteristics

	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes(N)	*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*		*0*	*0*	*0*	
Volume (V), veh/h	*0*	*620*	*56*	*0*	*60*	*620*	*0*	*0*	*106*	*0*	*174*	*0*	*0*	*0*	*0*	*0*
Heavy Veh. Adj. (f_{HV}), %	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Peak Hour Factor (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*	*0.90*	*0.90*	*0.90*	*0.90*
No. of Pedestrians Crossing Entry	*0*				0				0				0			

Critical and Follow-Up Headway Adjustment

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*
Follow-Up Headway (sec)	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*

Flow Computations

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Circulating Flow (V_c), pc/h	*68*			*120*			*703*			*891*		
Exiting Flow (V_{ex}), pc/h	*900*			*823*			*0*			*131*		
Entry Flow (V_e), pc/h		*766*			*771*			*317*				
Entry Volume veh/h		*751*			*756*			*311*				

Capacity and v/c Ratios

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Capacity (c_{PCE}), pc/h		*1056*			*1002*			*559*			*464*	
Capacity (c), veh/h		*1035*			*982*			*548*			*455*	
v/c Ratio (X)		*0.73*			*0.77*			*0.57*				

Delay and Level of Service

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		*15.7*			*18.6*			*17.7*				
Lane LOS		*C*			*C*			*C*				
Lane 95% Queue		*6.7*			*7.8*			*3.5*				
Approach Delay, s/veh	*15.70*			*18.59*			*17.66*					
Approach LOS, s/veh	*C*			*C*			*C*					
Intersection Delay, s/veh	*17.30*											
Intersection LOS	*C*											

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ROUNDABOUT REPORT

General Information		Site Information	
Analyst	*M. Nolt*	Intersection	*Ridge at Site Access*
Agency or Co.	*The Kleingers Group*	E/W Street Name	
Date Performed	*6/11/2013*	N/S Street Name	
Time Period	*AM Peak*	Analysis Year	*2013*
		Project ID	*Amberley Green*

Project Description:

Volume Adjustment and Site Characteristics

	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes(N)	*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*	
Volume (V), veh/h	*12*	*0*	*27*	*0*	*6*	*0*	*3*	*0*	*77*	*638*	*7*	*0*	*4*	*801*	*70*	*0*
Heavy Veh. Adj. (f_{HV}), %	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Peak Hour Factor (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*	*0.90*	*0.90*	*0.90*	*0.90*
No. of Pedestrians Crossing Entry	*0*				0				0				0			

Critical and Follow-Up Headway Adjustment

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*
Follow-Up Headway (sec)	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*

Flow Computations

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Circulating Flow (V_c), pc/h	*920*			*824*			*19*			*94*		
Exiting Flow (V_{ex}), pc/h	*13*			*166*			*740*			*946*		
Entry Flow (V_e), pc/h		*45*			*10*			*818*			*992*	
Entry Volume veh/h		*44*			*10*			*802*			*973*	

Capacity and v/c Ratios

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Capacity (c_{PCE}), pc/h		*450*			*496*			*1109*			*1029*	
Capacity (c), veh/h		*441*			*486*			*1087*			*1009*	
v/c Ratio (X)		*0.10*			*0.02*			*0.74*			*0.96*	

Delay and Level of Service

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		*9.6*			*7.7*			*15.7*			*40.4*	
Lane LOS		*A*			*A*			*C*			*E*	
Lane 95% Queue		*0.3*			*0.1*			*7.0*			*17.0*	
Approach Delay, s/veh	*9.57*			*7.66*			*15.68*			*40.43*		
Approach LOS, s/veh	*A*			*A*			*C*			*E*		
Intersection Delay, s/veh	*28.66*											
Intersection LOS	*D*											

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ROUNDABOUT REPORT

General Information		Site Information	
Analyst	*M. Nolt*	Intersection	*Ridge at Site Access*
Agency or Co.	*The Kleingers Group*	E/W Street Name	
Date Performed	*6/11/2013*	N/S Street Name	
Time Period	*PM Peak*	Analysis Year	*2013*
		Project ID	*Amberley Green*

Project Description:

Volume Adjustment and Site Characteristics

	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes(N)	*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*		*0*	*1*	*0*	
Volume (V), veh/h	*58*	*0*	*84*	*0*	*7*	*0*	*2*	*0*	*45*	*752*	*19*	*0*	*6*	*720*	*62*	*0*
Heavy Veh. Adj. (f_{HV}), %	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*
Peak Hour Factor (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*	*0.90*	*0.90*	*0.90*	*0.90*
No. of Pedestrians Crossing Entry	*0*				0				0				0			

Critical and Follow-Up Headway Adjustment

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*	*5.1929*
Follow-Up Headway (sec)	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*	*3.1858*

Flow Computations

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Circulating Flow (V_c), pc/h	*831*			*969*			*73*			*59*		
Exiting Flow (V_{ex}), pc/h	*29*			*121*			*920*			*919*		
Entry Flow (V_e), pc/h		*161*			*10*			*925*			*893*	
Entry Volume veh/h		*158*			*10*			*907*			*875*	

Capacity and v/c Ratios

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Capacity (c_{PCE}), pc/h		*492*			*429*			*1050*			*1065*	
Capacity (c), veh/h		*482*			*421*			*1029*			*1044*	
v/c Ratio (X)		*0.33*			*0.02*			*0.88*			*0.84*	

Delay and Level of Service

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		*12.7*			*8.9*			*27.0*			*22.5*	
Lane LOS		*B*			*A*			*D*			*C*	
Lane 95% Queue		*1.4*			*0.1*			*12.3*			*10.4*	
Approach Delay, s/veh	*12.70*			*8.87*			*27.03*			*22.51*		
Approach LOS, s/veh	*B*			*A*			*D*			*C*		
Intersection Delay, s/veh	*23.75*											
Intersection LOS	*C*											

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