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December 31, 2013

Mr. Eric Moseley
Volunteer Development
405 Montbrook
Knoxville, TN 37919

RE: GLEN AT HARDIN VALLEY

Dear Mr. Moseley:

CDM Smith has completed its review of the current plan for the above referenced development located in the Hardin Valley area of Knox County. The previous site plan is illustrated in **Figure 1**, and its location is illustrated in **Figure 2**. Please find below in Table 1 the change in the trip generation for the site from that submitted in traffic impact study dated January of 2006 and the revised trip generation for the current plan of the site. The 2006 plan included 70 apartment units and 100 single-family units. The comparison increased the single-family units from 100 to 117 units, accessing Hardin Valley Road from Brook Willow Boulevard with another 3sfu accessing Sam Lee Road. The increased number of trips accessing Hardin Valley Road is 161 daily, 12 AM peak hour, and 13 PM peak hour.

Table 1
TRIP GENERATION
COMPARISON

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
Multi-Family Units	Knox Co.	70	692	8	30	31	25
Single-Family Units	210	100	1,040	20	60	69	39
Sub-Total			**1,732**	**28**	**90**	**100**	**64**
Multi-Family Units	Knox Co.	70	692	8	30	31	25
Single-Family Units	210	117	1,201	23	69	76	45
Sub-Total			**1,893**	**31**	**99**	**107**	**70**
Increase in Trips Generated			**161**	**3**	**9**	**7**	**6**

A peak-hour turning movement count (TMC) was conducted for the site access in December 2013 and illustrated in **Figure 3**. Background traffic, illustrated in **Figure 4**, was developed for 2015 by factoring the Hardin Valley Road traffic by 1.03, representing a 1.5-percent growth rate over the next two years. **Figures 5A and 5B** illustrate the AM and PM peak-hour trip assignment, respectively, based on the observed distribution.

Figure 6 illustrates the resulting site generated trips. The project related trips added to background traffic is illustrated in **Figure 7** and are analyzed for capacity and level of service (LOS). **Table 2** presents the results of the analyses conducted

Table 2
CAPACITY AND LEVEL OF SERVICE

Intersection	Traffic Control	AM Peak Hour V/C	AM Peak Hour Delay	AM Peak Hour LOS	PM Peak Hour V/C	PM Peak Hour Delay	PM Peak Hour LOS
Hardin Valley Rd & Brook Willow Blvd	STOP	0.14	11.9	B	0.11	13.7	B

NOTE: Delay estimated in seconds.

The STOP controlled Brooke Willow Boulevard approach to Hardin Valley Road will operate at an acceptable level of service. Projected turning movements found that turn lanes remain warranted as identified in the previous study. The recommended left-turn storage, however, can be reduced to 75-feet.

If you have any questions regarding this traffic assessment update, please call me.

Sincerely,
CDM Smith, Inc.

John F. Gould, P.E.
Senior Project Manager

Enclosure: Figures 1-7
Turn Lane Evaluation
Unsignalized Intersection Analyses

SITE PLAN

Glen at Hardin Valley

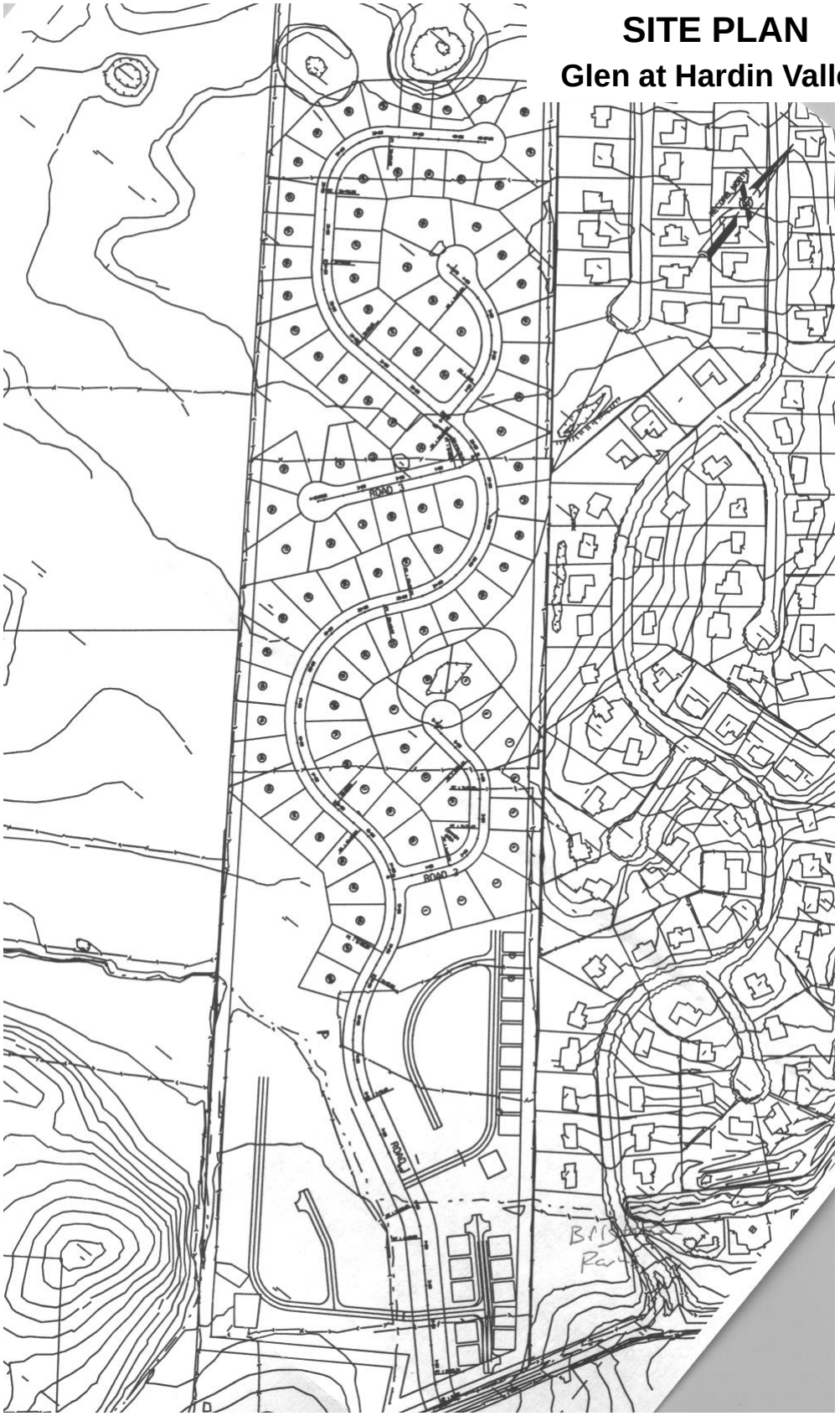


Figure 1

VICINITY MAP
Glen at Hardin Valley

N

Figure 2

2013 EXISTING TRAFFIC

Glen at Hardin Valley

LEGEND

XXX AM PEAK

(XXX) PM PEAK

N

Figure 3

2015 BACKGROUND TRAFFIC

Glen at Hardin Valley

LEGEND

XXX AM PEAK

(XXX) PM PEAK

Figure 4

AM PEAK-HOUR ASSIGNMENT

Glen at Hardin Valley

LEGEND
XXX ENTERINGTRIPS
(XXX) EXITING TRIPS

Figure 5A

PM PEAK-HOUR ASSIGNMENT

Glen at Hardin Valley

LEGEND

XXX ENTERINGTRIPS

(XXX) EXITING TRIPS

Figure 5B

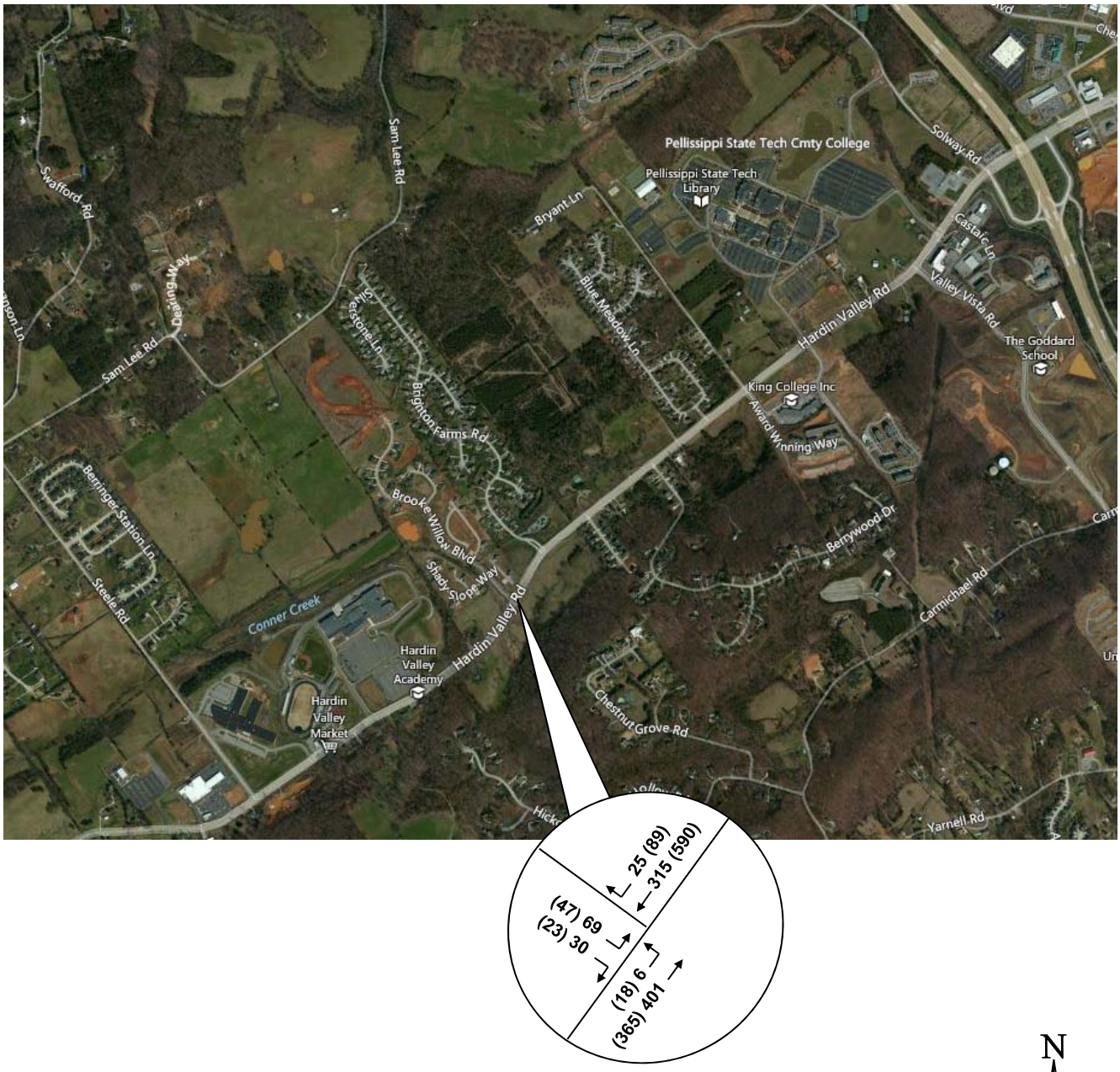
PROJECT TRIPS
Glen at Hardin Valley

LEGEND
XXX AM PEAK
(XXX) PM PEAK

Figure 6

2015 PROJECTED TRAFFIC

Glen at Hardin Valley



LEGEND

XXX AM PEAK

(XXX) PM PEAK

N

Figure 7

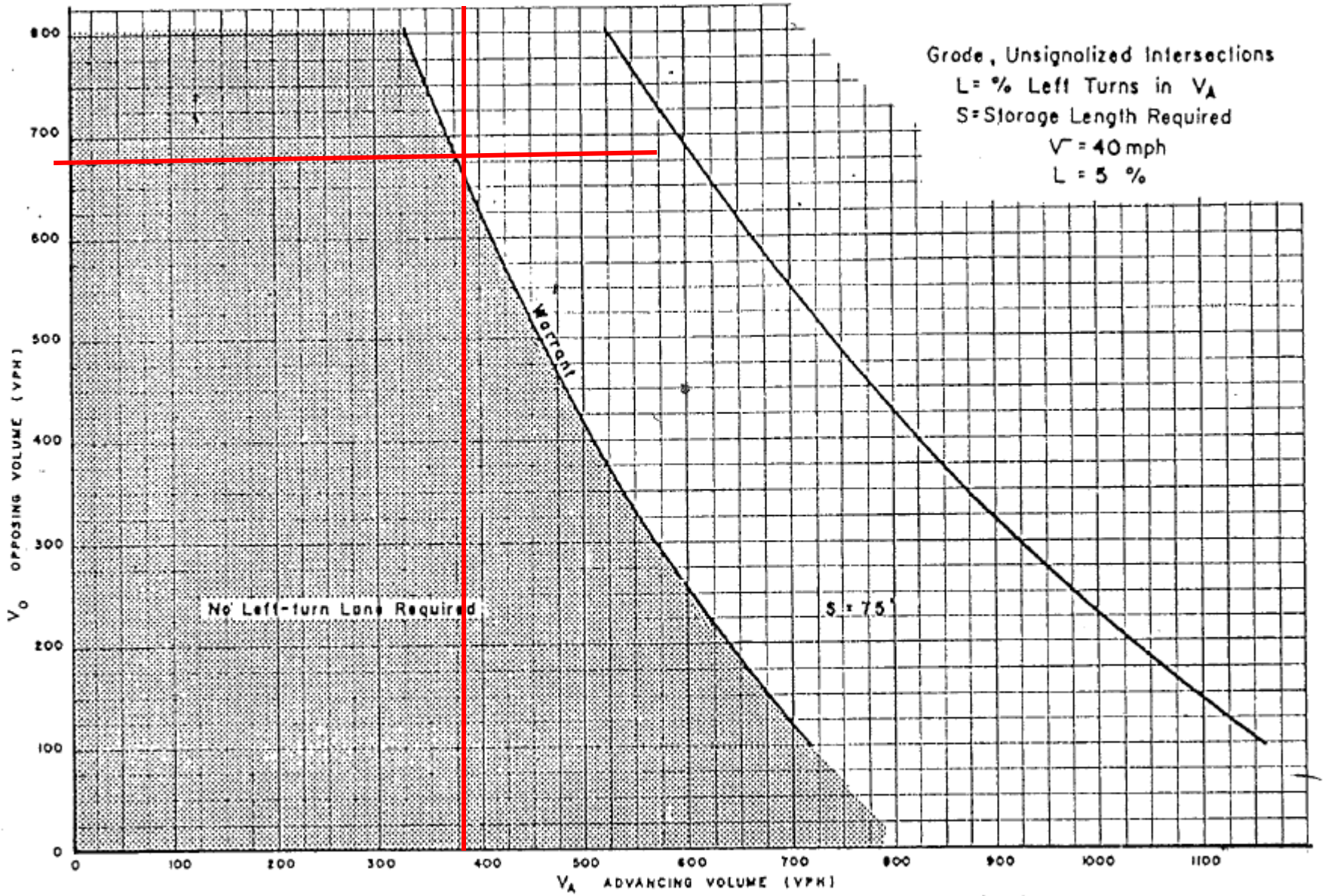
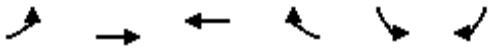


Figure 2. Warrant for left-turn storage lanes on two-lane highways.

RIGHT-TURN VOLUME	THROUGH VOLUME PLUS LEFT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 600	+ / > 600
Fewer Than 25						
25 - 49					Yes	Yes
50 - 99				Yes	Yes	Yes
100 - 149			Yes	Yes	Yes	Yes
150 - 199		Yes	Yes	Yes	Yes	Yes
200 - 249	Yes	Yes	Yes	Yes	Yes	Yes
250 - 299	Yes	Yes	Yes	Yes	Yes	Yes
300 - 349	Yes	Yes	Yes	Yes	Yes	Yes
350 - 399	Yes	Yes	Yes	Yes	Yes	Yes
400 - 449	Yes	Yes	Yes	Yes	Yes	Yes
450 - 499	Yes	Yes	Yes	Yes	Yes	Yes
500 - 549	Yes	Yes	Yes	Yes	Yes	Yes
550 - 599	Yes	Yes	Yes	Yes	Yes	Yes
600 or More	Yes	Yes	Yes	Yes	Yes	Yes

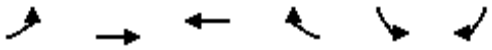
* Or through volume only if a left-turn lane exists.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	6	401	315	25	69	30
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	436	342	27	75	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	370				791	342
vC1, stage 1 conf vol					342	
vC2, stage 2 conf vol					449	
vCu, unblocked vol	370				791	342
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	99				86	95
cM capacity (veh/h)	1189				554	700

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	7	436	342	27	75	33
Volume Left	7	0	0	0	75	0
Volume Right	0	0	0	27	0	33
cSH	1189	1700	1700	1700	554	700
Volume to Capacity	0.01	0.26	0.20	0.02	0.14	0.05
Queue Length 95th (ft)	0	0	0	0	12	4
Control Delay (s)	8.0	0.0	0.0	0.0	12.5	10.4
Lane LOS	A				B	B
Approach Delay (s)	0.1		0.0		11.9	
Approach LOS					B	

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	365	590	89	47	23
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	397	641	97	51	25
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	738				1077	641
vC1, stage 1 conf vol					641	
vC2, stage 2 conf vol					436	
vCu, unblocked vol	738				1077	641
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				89	95
cM capacity (veh/h)	868				447	475

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	20	397	641	97	51	25
Volume Left	20	0	0	0	51	0
Volume Right	0	0	0	97	0	25
cSH	868	1700	1700	1700	447	475
Volume to Capacity	0.02	0.23	0.38	0.06	0.11	0.05
Queue Length 95th (ft)	2	0	0	0	10	4
Control Delay (s)	9.2	0.0	0.0	0.0	14.1	13.0
Lane LOS	A				B	B
Approach Delay (s)	0.4		0.0		13.7	
Approach LOS					B	

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		