

BOULDER POINT SUBDIVISION Knox County, Tennessee

TRAFFIC IMPACT STUDY



***Prepared for :
BATSON, HIMES, NORVELL, & POE***

Prepared By:



December 2007

BOULDER POINT SUBDIVISION

KNOX COUNTY, TENNESSEE

TRAFFIC IMPACT STUDY

Prepared for

BATSON, HIMES, NORVELL & POE

4334 Papermill Drive

Knoxville, Tennessee 37909



Prepared by

WILBUR SMITH ASSOCIATES

Alexander Place

1100 Marion Street, Suite 200

Knoxville, Tennessee 37921

Project No. 102130

TABLE OF CONTENTS

INTRODUCTION	1
Project Description.....	1
Site Location.....	1
LOCAL AND REGIONAL ACCESS	4
LOCAL AND REGIONAL ACCESS	4
Local Access.....	4
Regional Access.....	4
EXISTING TRAFFIC CONDITIONS	5
Existing Traffic Control and Speed.....	5
Existing Traffic Volumes.....	5
Existing Capacity and Level of Service.....	5
BACKGROUND TRAFFIC CONDITIONS	8
Background Traffic Volumes.....	8
Background Capacity and Level of Service.....	8
PROJECT IMPACTS	10
Trip Generation.....	10
Trip Distribution and Assignment.....	10
Project Traffic Volumes.....	10
Total Projected Traffic Volumes.....	13
Auxiliary Lane Evaluation.....	13
Projected Capacity and Level of Service.....	13
Sight Distance.....	16
RECOMMENDATIONS	18
CONCLUSION	18
APPENDIX	19

LIST OF FIGURES

Figure 1: Proposed Site Plan	2
Figure 2: Vicinity Map.....	3
Figure 3: 2007 Existing Traffic.....	6
Figure 4: 2010 Background Traffic.....	9
Figure 5: Distribution and Assignment.....	11
Figure 6: Project Trips.....	12
Figure 7: 2010 Projected Traffic.....	15
Figure 8: Sight-Distances.....	17

LIST OF TABLES

Table 1- Unsignalized LOS Description.....	7
Table 2- 2007 Existing Capacity and Level of Service	7
Table 3- 2010 Background Capacity and Level of Service.....	8
Table 4- Trip Generation.....	10
Table 5- 2010 Projected Capacity and Level of Service.....	13
Table 6- Capacity and Level of Service Summary.....	14

INTRODUCTION

Wilbur Smith Associates (WSA) is pleased to submit this report to address any traffic impact and access of a residential development located on Stanley Road in north Knox County. The basis for this study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth and from the potential site. Analyses of the resulting traffic projections were conducted to determine the capacity and levels of service for the site access to Stanley Road and Clinton Highway (US 25W). This study will evaluate the development's impact and determine if any mitigation measures are necessary to minimize the traffic impact including improved roadway geometrics and traffic control devices.

Project Description

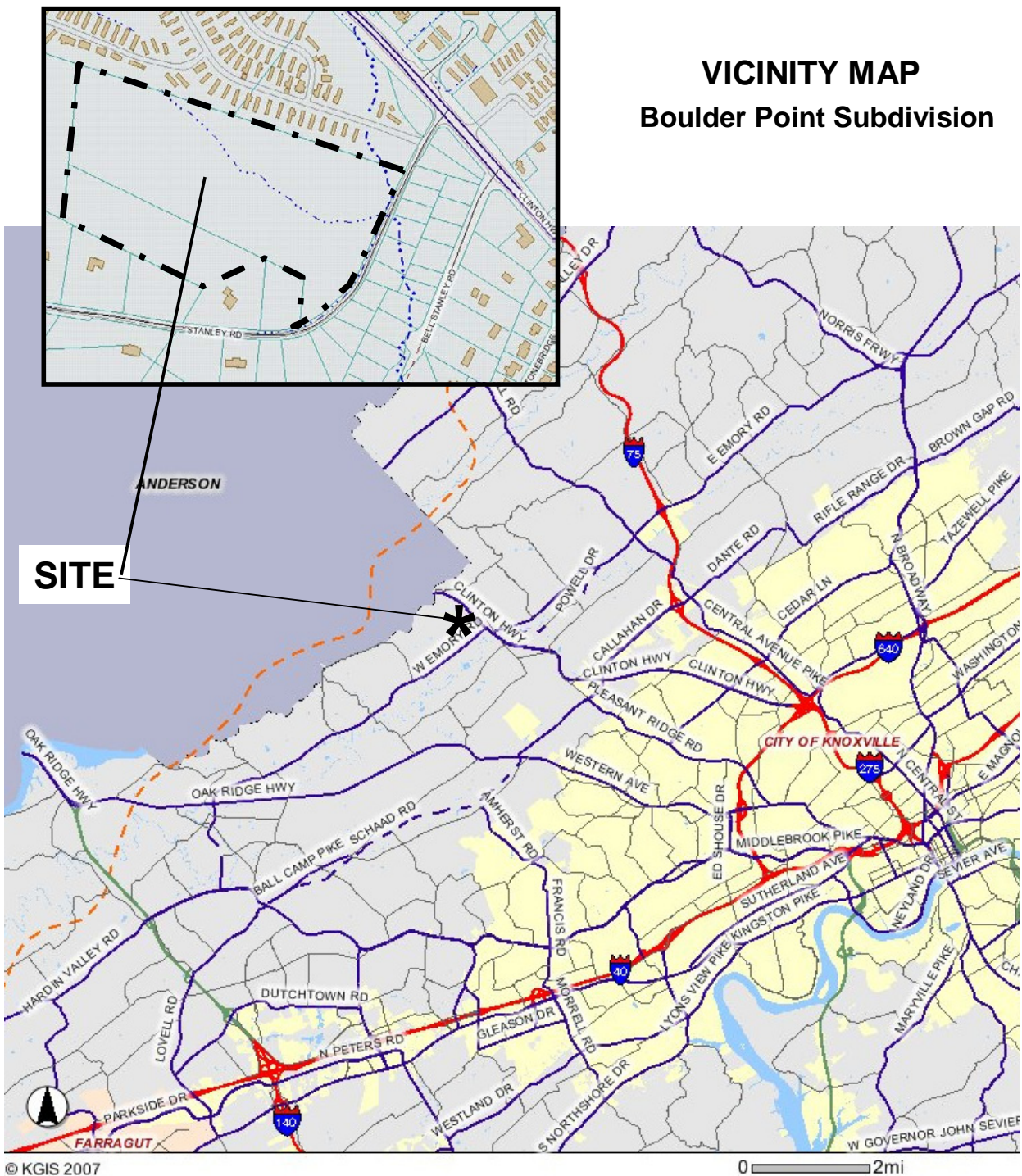
The proposed project is a residential development. The development is 75 single-family units on approximately 23.75 acres. The site access is to Stanley Road from a proposed residential street. Figure 1 shows the proposed site plan.

Site Location

The location of the proposed residential development is north side of Stanley Road and west of Clinton Highway (U.S. 25W) in north Knox County, Tennessee, near Anderson County. Figure 2 illustrates the site location relative to local and regional access.

VICINITY MAP

Boulder Point Subdivision



© KGIS 2007

0 2mi



Figure 2

LOCAL AND REGIONAL ACCESS

Local Access

The proposed local access is to Stanley Road. The adjacent street facility is approximately 18-feet in width and extends between Clinton Highway (U.S. 25W) and Old Clinton Pike to the north of the site in Anderson County. Stanley Road has an estimated 2007 average daily traffic (ADT) of 1,195.

Regional Access

Regional access to this site is from Clinton Highway (US 25W) accessed to the east of the site or north of the site. Clinton Highway extends northwest into Anderson County and southeast into Knoxville. Interstate 75 is east of the site and can be accessed using Emory Road (SR 131) which intersects Clinton Highway to the + south. Clinton Highway extend southeast where it intersects the I-75 and I-640 interchange.

Interstate 640 connects to I-40 east and west of the Knoxville CBD and becomes I-75 to the west. Interstate 640, east of Clinton Highway, has a 2006 ADT of 38,660. Interstate 40 is an east and west facility extending between Nashville, Tennessee, and Asheville, North Carolina. The approximate 2003 ADT for I-40/75 west of I-640 is 152,130. To the east of I-640, I-40 has an ADT of 101,080. Interstate 75 extends north to Lexington, Kentucky, and to the west, I-75 turns south to Chattanooga, Tennessee.

EXISTING TRAFFIC CONDITIONS

Existing Traffic Control and Speed

Street approaches to Stanley Road in the project vicinity are STOP controlled. The posted speed limit for Stanley Road is 30mph.

Existing Traffic Volumes

WSA conducted turning movement count for the intersections of Stanley Road at Clinton Highway and Grand Oak subdivision in November 2007. The AM and PM peak hours are found between 7:00 to 8:00a.m. and 5:00 to 6:00p.m. Figure 3 illustrates the AM and PM peak-hour traffic volumes at the proposed intersection location of the proposed residential street.

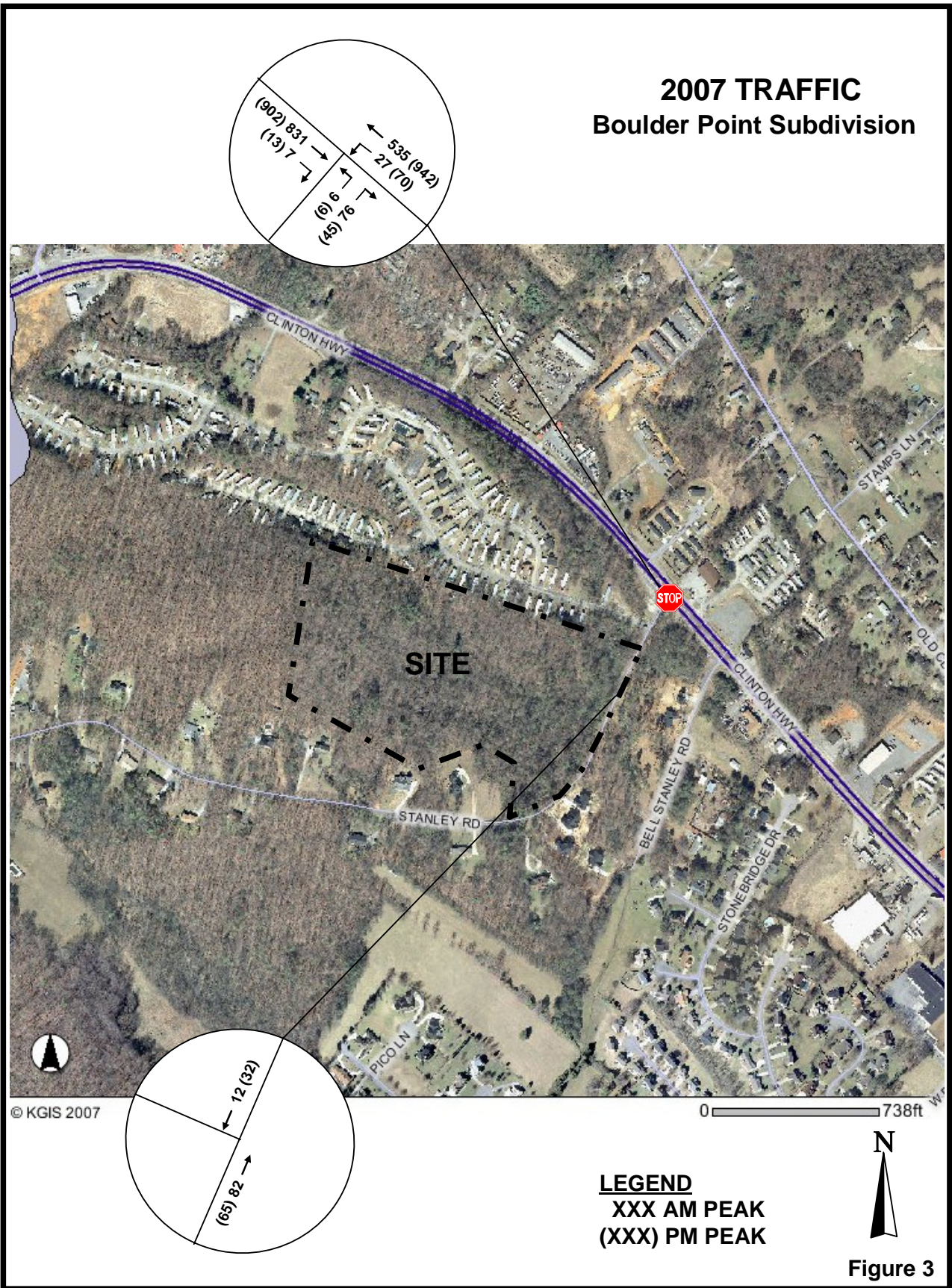
Existing Capacity and Level of Service

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the 2000 Highway Capacity Manual, Special Report 209 published by the Transportation Research Board (TRB). Signalized and unsignalized intersections are evaluated based on estimated intersection delays, which may be related to level of service (LOS).

Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing. For signalized intersections, a LOS of A has an average estimated intersection delay of less than 10 seconds, and LOS F has an estimated delay of greater than 80 seconds. A LOS of C and D are typical design values. Within urban areas, a LOS D, delay between 35 and 55 seconds, is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections.

Unsignalized intersection levels of service have lower thresholds of delays. A LOS of F exceeds estimated delays of 50 seconds. For urban arterials, minor approaches may frequently experience levels of service E. A full level of service description for unsignalized intersections is presented in Tables 1.

2007 TRAFFIC Boulder Point Subdivision



LEGEND
 XXX AM PEAK
 (XXX) PM PEAK

Figure 3

**Table 1
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR TWO-WAY STOP INTERSECTIONS**

Level of Service	Average Control Delay per Vehicle (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

SOURCE: Highway Capacity Manual, TRB Special Report 209

Analyses were conducted using the Synchro Software, developed by Trafficware. The analyses conducted found that the study intersections currently operate at a minimum LOS of a C with STOP control. Table 2 presents the capacity and levels of service for the study intersections.

**Table 2
2007 EXISTING
CAPACITY AND LEVEL OF SERVICE**

Intersection	Traffic Control	Peak	V/C	Delay	LOS
Clinton Hwy (US 25W) & Stanley Road	STOP	AM	0.15	13.9	B
	EB	PM	0.09	17.6	C

NOTE: Delay estimated in seconds.

BACKGROUND TRAFFIC CONDITIONS

Background traffic is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other development as well as the continued growth through the study area. This background traffic is projected for the purpose of establishing a baseline.

Background Traffic Volumes

Historical traffic data is reviewed to determine traffic growth trends in the study area. Using the MPC count station on Clinton Highway, the annual growth rate was determined to be 0.92-percent over the past 23 years. For the purpose of this study, background traffic volumes were developed assuming an annual compounded growth rate of 2.5-percent. Background traffic is projected for the year 2010, a 7.7-percent growth in the adjacent street traffic volume. Build-out of the site is planned in the next few years. Actual build-out, however, will depend largely on the housing market.

Figure 4 presents the resulting Year 2010 AM and PM peak-hour traffic volumes without the proposed development.

Background Capacity and Level of Service

Analysis was performed with the grown traffic volumes and is presented in Table 3. The levels of service are measured to be acceptable for the unsignalized study intersection of Clinton Highway and Stanley Road with background conditions.

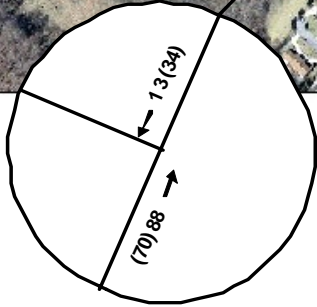
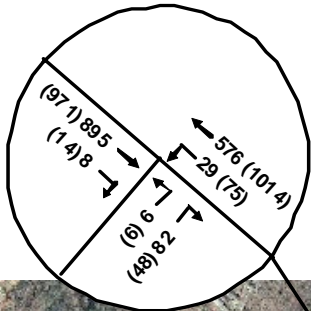
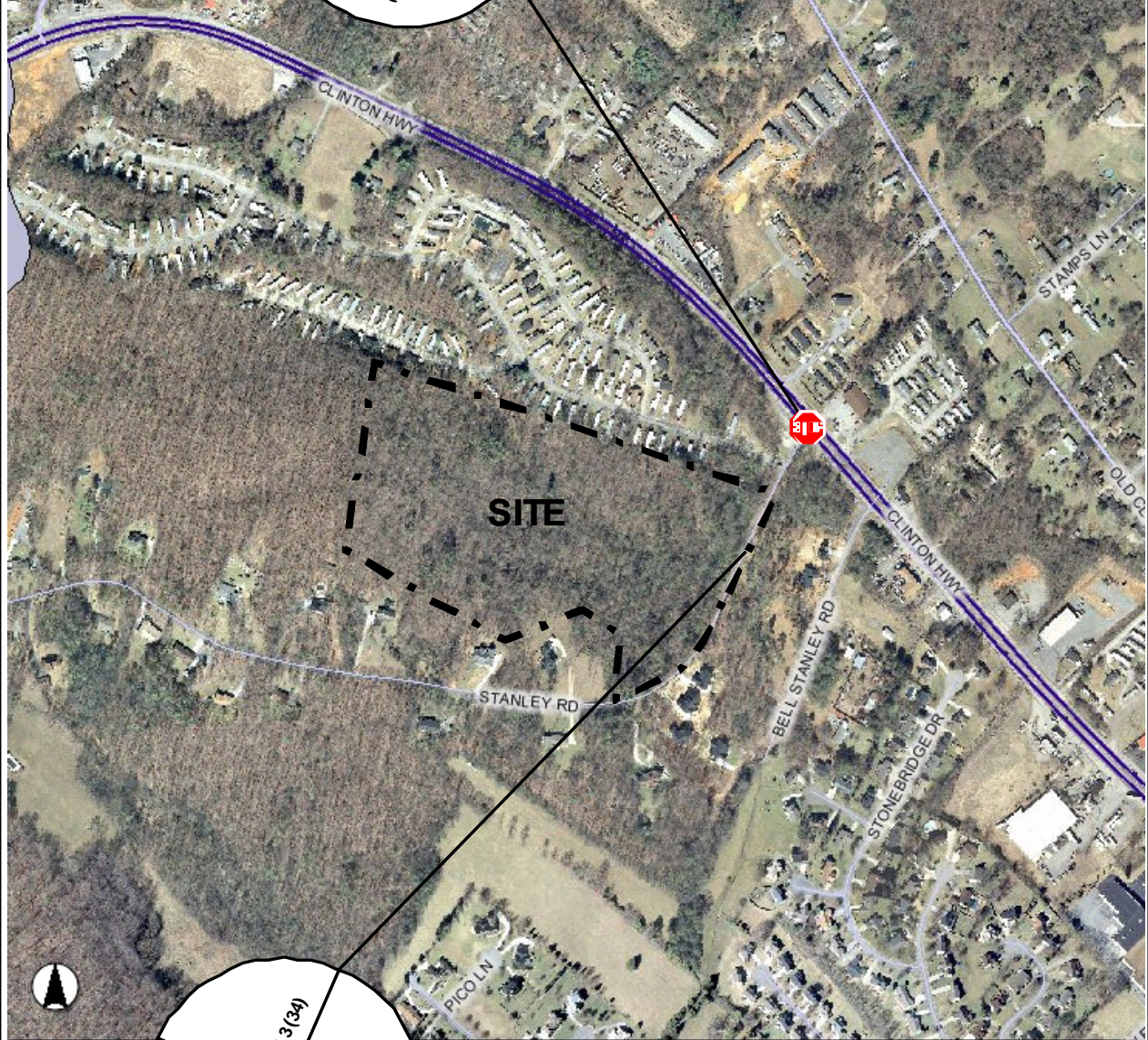
**Table 3
2010 BACKGROUND TRAFFIC
CAPACITY AND LEVEL OF SERVICE**

Intersection	Traffic Control	Peak	V/C	Delay	LOS
Clinton Hwy (US 25W) & Stanley Road	STOP	AM	0.17	14.6	B
	EB	PM	0.11	19.2	C

NOTE: Delay estimated in seconds.

2010 BACKGROUND TRAFFIC

Boulder Point Subdivision



© KGIS 2007

0 738ft

LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 4

PROJECT IMPACTS

Project conditions are developed by generating traffic based on the proposed land use, distributing the trips to the transportation network, and again conducting analyses for capacity and level of service.

Trip Generation

Project traffic was determined using the publication, **Trip Generation, 7th Edition**. This reference is published by the Institute of Transportation Engineers (ITE) and represents national data collected for many different land uses including industrial, residential and commercial uses. **Trip Generation** is an essential tool in calculating the traffic, which may be generated by a proposed development. The study will generate traffic for 75 single-family units. From the trip generation calculations, the proposed site may generate approximately 800 daily trips. Table 4 presents the trip generation of this proposed site.

**Table 4
TRIP GENERATION**

Land Use	Land-Use Code	Units	Daily Trips	AM Peak-Hour Trips		PM Peak-Hour Trips	
				Enter	Exit	Enter	Exit
Single-Family	210	75	798	15	46	53	30

Reference: **Trip Generation, 7th Edition**

Trip Distribution and Assignment

Using the TMC conducted for Clinton Highway and Stanley Road, residential development characteristics, and the local and regional roadway network, generated trips are distributed to Clinton Highway with 10-percent distributed to the north and 90-percent to the south during the AM and PM peak hours. Figure 5 illustrates this distribution and assignment.

Project Traffic Volumes

By multiplying the trips generated by the distribution percentages, the project traffic volumes are determined. Figure 6 illustrates the resulting project traffic volumes associated with the proposed project.

DISTRIBUTION AND ASSIGNMENT

Boulder Point Subdivision

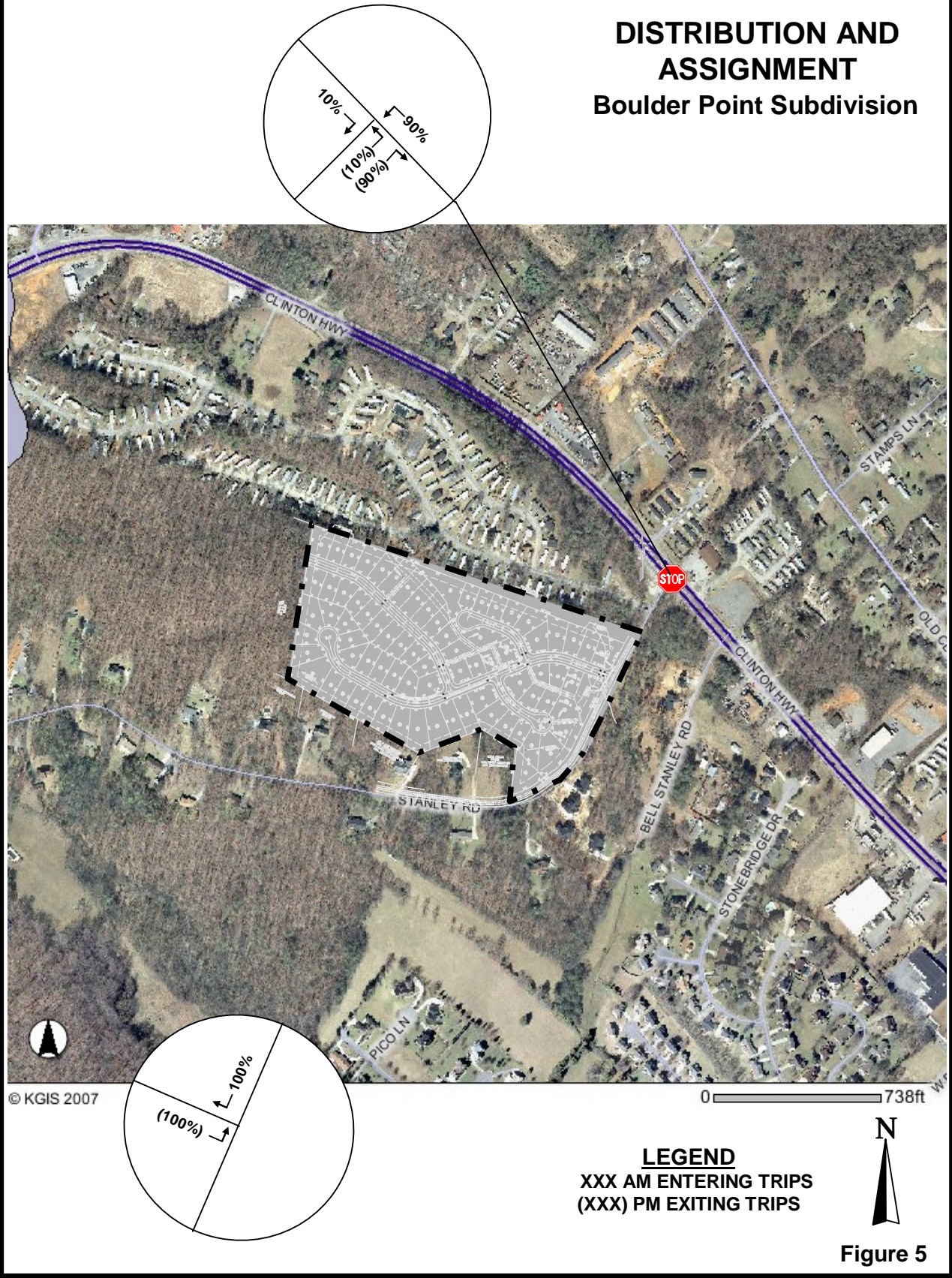
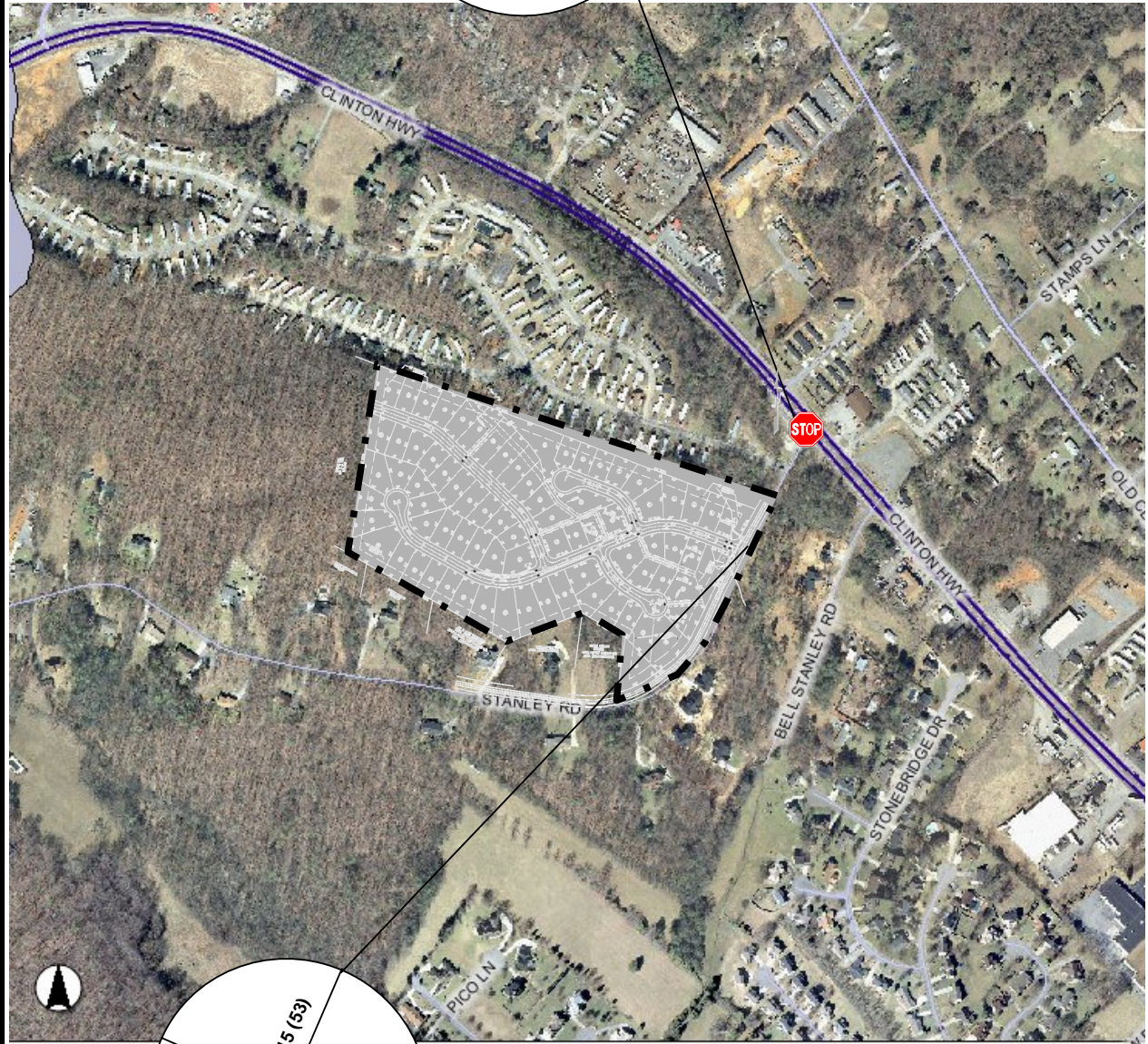


Figure 5

PROJECT TRAFFIC Boulder Point Subdivision



© KGIS 2007

0 738ft

LEGEND
 XXX AM PEAK
 (XXX) PM PEAK



Figure 6

Total Projected Traffic Volumes

Background and project traffic volumes were added together to develop post-development traffic volumes for the year 2010. Figure 7 illustrates this 2010 projection. Using these projections, mitigation measures including traffic control devices and roadway and intersection geometry can be evaluated. The requirements of left- and right-turn lanes were evaluated using the criteria adopted by the MPC.

Auxiliary Lane Evaluation

Using the Knox County policy for turn lane requirements, found in the Knox County's **Access Control and Driveway Design Policy**, projected traffic volumes for the proposed street were evaluated for the need to provide auxiliary lanes. The Knox County policy for left-turn lanes is based on the **Highway Research Record** report titled, *Volume Warrants for Left-turn Storage Lanes at Unsignalized Grade Intersections*, by M.D. Harmelink, and an extrapolation of that report by Knox County. The evaluation indicates that left- or right- turn lanes are not necessary. The anticipated left-turn volume is nominal with an opposing traffic volume less than 100. A left-turning volume of less than 300vph would not require a left-turn lane. The right-turn volume from Stanley Road to the proposed street is 53vph and the advancing through traffic flow is less than 100vph; therefore, a right-turn lane is not warranted using the Knox County criteria.

Projected Capacity and Level of Service

The development of the site has an insignificant impact on the proposed intersection with Stanley Road and the intersection of Stanley Road with Clinton Highway. The development of 75 single-family units is presented in Table 5, and a summary is provided in Table 6. Results conclude that the study intersections would operate at a very acceptable level of service for projected traffic volumes.

**Table 5
2010 PROJECTED TRAFFIC
CAPACITY AND LEVEL OF SERVICE**

Intersection	Traffic Control	Peak	V/C	Delay	LOS
Clinton Hwy (US 25W) & Stanley Road	STOP	AM	0.26	16.1	C
	EB	PM	0.20	22.5	C
Stanley Road & Proposed Street	STOP	AM	0.00	0.1	A
	SB	PM	0.00	0.1	A

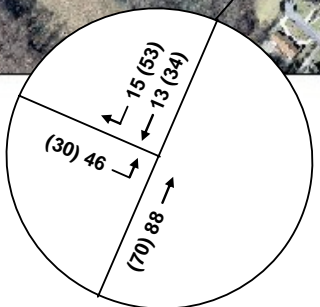
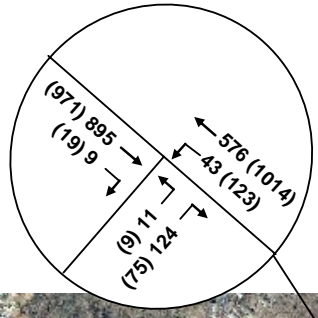
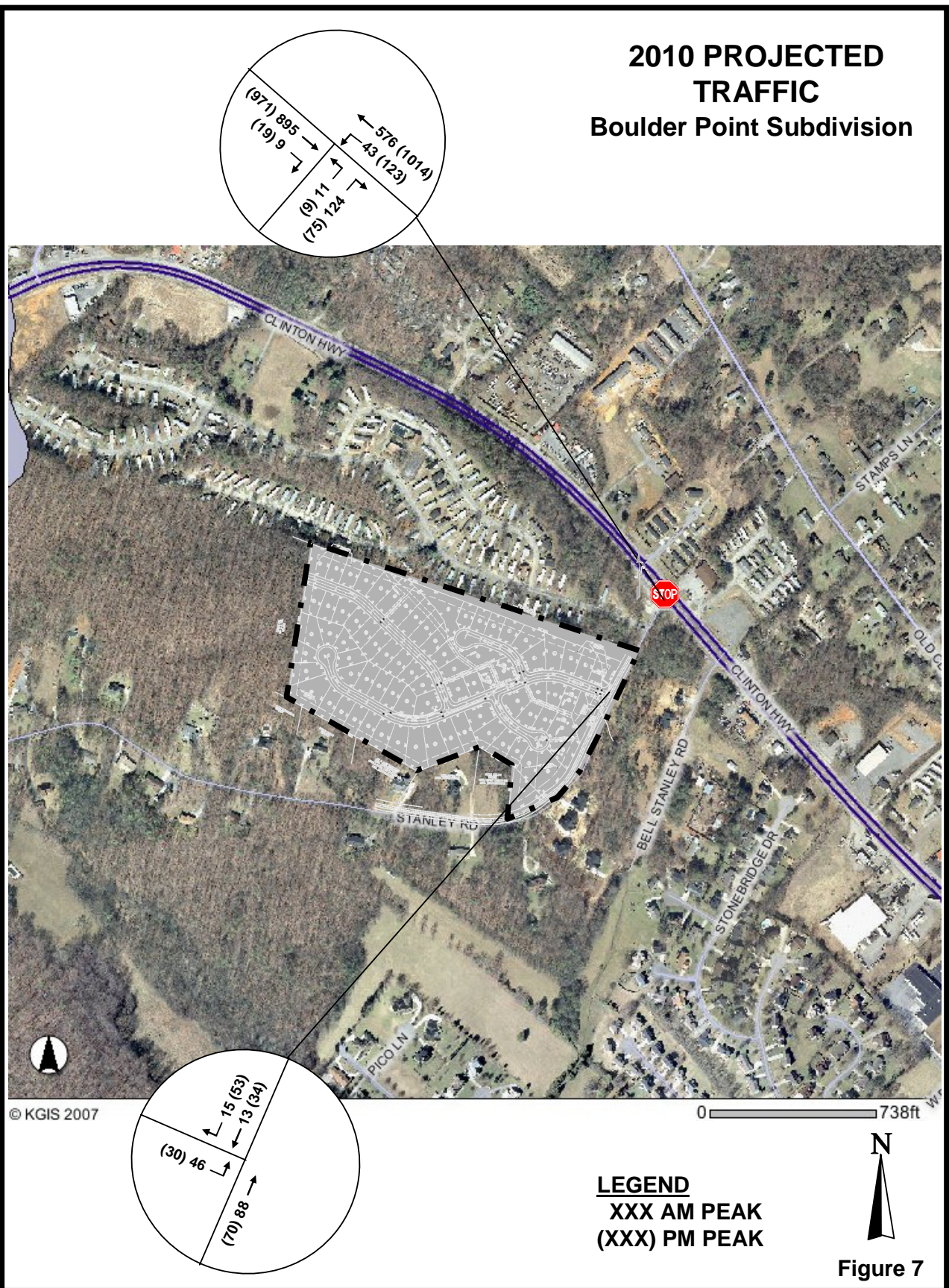
NOTE: Delay estimated in seconds.

**Table-6
CAPACITY AND LEVEL OF SERVICE
SUMMARY**

Intersection	Traffic Control	Peak	2007 Existing			2010 Background			2010 Projected		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
Clinton Hwy (US 25W) & Stanley Road	STOP	AM	0.15	13.9	B	0.17	14.6	B	0.26	16.1	C
	EB	PM	0.09	17.6	C	0.11	19.2	C	0.20	22.5	C
Stanley Road & Proposed Street	STOP	AM	-	-	-	-	-	-	0.00	0.1	A
	SB	PM	-	-	-	-	-	-	0.00	0.1	A

NOTE: Delay estimated in seconds.

2010 PROJECTED TRAFFIC Boulder Point Subdivision



Sight Distance

The project is proposed to access Stanley Road, which has a posted speed limit of 30mph. Sight distance was measured using the criteria published by the American Association of State Highway and Transportation Officials (AASHTO). Measured sight-distance for the proposed residential street at Stanley Road was measured to be approximately 300 feet to the east and approximately 550 to the west.

The speed limit of 30mph requires a minimum sight-distance of 200 feet to meet the minimum stopping sight-distance for AASHTO and 300 feet to meet the adopted Knox County minimum corner sight-distance standard. Therefore, the measured sight-distance is more than adequate for safe egress from the proposed development.

RECOMMENDATIONS

The analyses conducted and the review of the traffic volumes identified the following recommendations:

- Minimize landscaping, using low growing vegetation, and signing at the proposed street access to insure that safe sight distance is maintained.
- Use a minimum intersection radius of 30-foot for the efficient and safe ingress and egress of the site.
- Post STOP signs (R1-1) at the proposed residential street at Stanley Road.
- Intersection design should conform to the recommended standards and practices of the American Association of State Highway and Transportation Officials, the Institute of Transportation Engineers, and the Knox County Engineering and Public Works Department.

CONCLUSION

The study of this proposed residential development evaluated the projected traffic conditions. Background traffic was determined using a 7.7-percent annual compounded growth rate until the horizon year 2010. Traffic associated with the proposed project was then generated and distributed to the proposed site access. Using the identified turning movements for the projected traffic conditions, unsignalized and signalized capacity and level of service analyses were conducted using the **2000 Highway Capacity Manual**. Unsignalized levels of service are found to be acceptable for the projected traffic conditions. The evaluation of the sight-distance for the proposed intersection is found to exceed that required for a 30mph. An evaluation for the requirement of left- and right-turn lanes using the Knox County policy determined that auxiliary turn lanes would not be necessary for the projected traffic volume. Therefore, with the recommendations of this report, the efficient and safe flow of traffic should be maintained with the development of the proposed subdivision.

APPENDIX

Trip Generation

ADT History

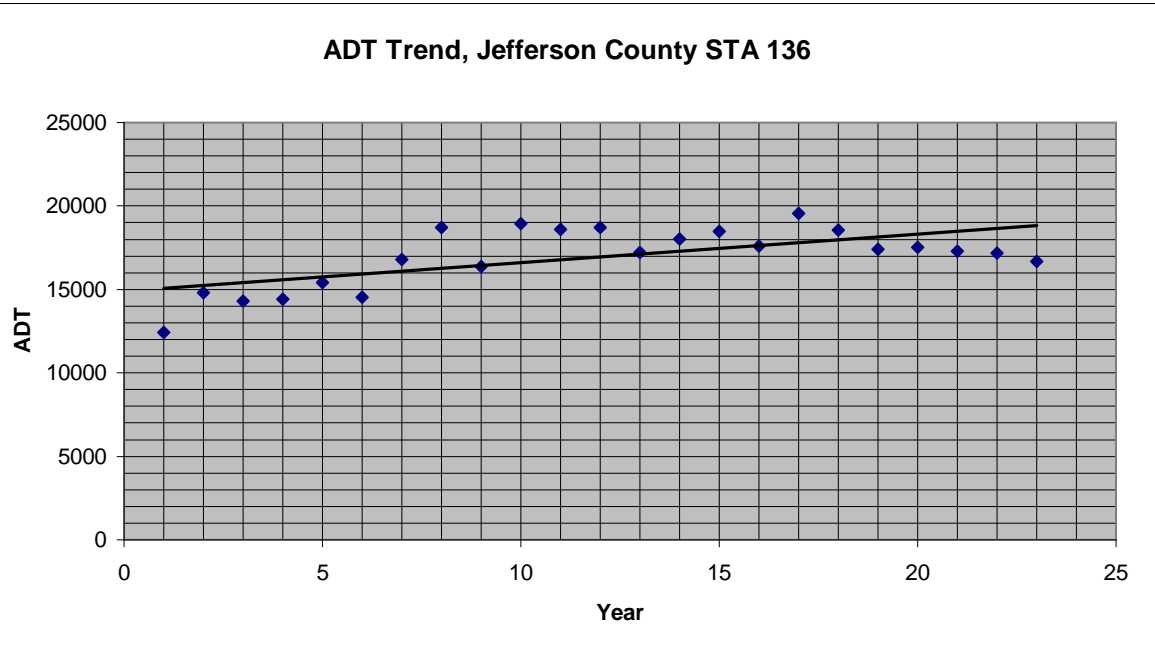
HCS Unsignalized Analyses

Knox County Turn Lane Volume Thresholds

Traffic Count Data

Station # 184 Route Number SR009
 County Knox Route name SR-9
 Location West of Powell Is Station Out? N

Rec	Year	Annual Average Daily Count	Remarks
23	1985	12440	
22	1986	14813	
21	1987	14290	
20	1988	14417	
19	1989	15405	
18	1990	14524	
17	1991	16782	
16	1992	18712	LOOKS HIGH
15	1993	16359	
14	1994	18935	
13	1995	18612	
12	1996	18720	
11	1997	17205	
10	1998	18009	
9	1999	18496	
8	2000	17601	
7	2001	19571	ACTUAL = 23879
6	2002	18541	
5	2003	17415	
4	2004	17526	
3	2005	17300	
2	2006	17166	
1	2007	16677	



Most Recent Trend Line Growth

Year	ADT
2006	18644
2007	18815

Annual Percent Growth 0.92%

Future ADTs per Trend Line

Year	ADT
2007	18815
2010	19328
2032	23087

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	76	27	535	831	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	83	29	582	903	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1257	455	911			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1257	455	911			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	85	96			
cM capacity (veh/h)	157	552	744			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	89	29	291	291	602	309
Volume Left	7	29	0	0	0	0
Volume Right	83	0	0	0	0	8
cSH	595	744	1700	1700	1700	1700
Volume to Capacity	0.15	0.04	0.17	0.17	0.35	0.18
Queue Length 95th (ft)	13	3	0	0	0	0
Control Delay (s)	13.9	10.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	13.9	0.5			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay	0.9					
Intersection Capacity Utilization	34.6%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	45	70	942	902	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	49	76	1024	980	14
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1652	497	995			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1652	497	995			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	91	89			
cM capacity (veh/h)	80	518	691			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	55	76	512	512	654	341
Volume Left	7	76	0	0	0	0
Volume Right	49	0	0	0	0	14
cSH	587	691	1700	1700	1700	1700
Volume to Capacity	0.09	0.11	0.30	0.30	0.38	0.20
Queue Length 95th (ft)	8	9	0	0	0	0
Control Delay (s)	17.6	10.9	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	17.6	0.8			0.0	
Approach LOS	C					

Intersection Summary						
Average Delay	0.8					
Intersection Capacity Utilization	42.6%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	82	29	576	895	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	89	32	626	973	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1353	491	982			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1353	491	982			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	83	95			
cM capacity (veh/h)	135	523	699			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	96	32	313	313	649	333
Volume Left	7	32	0	0	0	0
Volume Right	89	0	0	0	0	9
cSH	562	699	1700	1700	1700	1700
Volume to Capacity	0.17	0.05	0.18	0.18	0.38	0.20
Queue Length 95th (ft)	15	4	0	0	0	0
Control Delay (s)	14.6	10.4	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	14.6	0.5			0.0	
Approach LOS	B					

Intersection Summary						
Average Delay	1.0					
Intersection Capacity Utilization	36.7%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	48	75	1014	971	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	52	82	1102	1055	15
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1777	535	1071			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1777	535	1071			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	89	87			
cM capacity (veh/h)	64	490	647			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	59	82	551	551	704	367
Volume Left	7	82	0	0	0	0
Volume Right	52	0	0	0	0	15
cSH	551	647	1700	1700	1700	1700
Volume to Capacity	0.11	0.13	0.32	0.32	0.41	0.22
Queue Length 95th (ft)	9	11	0	0	0	0
Control Delay (s)	19.2	11.4	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	19.2	0.8	0.0			
Approach LOS	C					

Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization	44.8%		ICU Level of Service	A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	11	124	43	576	895	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	135	47	626	973	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1384	491	983			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1384	491	983			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	90	74	93			
cM capacity (veh/h)	126	523	698			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	147	47	313	313	649	334
Volume Left	12	47	0	0	0	0
Volume Right	135	0	0	0	0	10
cSH	569	698	1700	1700	1700	1700
Volume to Capacity	0.26	0.07	0.18	0.18	0.38	0.20
Queue Length 95th (ft)	26	5	0	0	0	0
Control Delay (s)	16.1	10.5	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	16.1	0.7			0.0	
Approach LOS	C					
Intersection Summary						
Average Delay	1.6					
Intersection Capacity Utilization	41.7%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis

5: Stanley Road & Proposed Street

11/30/2007



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	1	88	13	15	46	1
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)	1	96	14	16	50	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	30				120	22
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				120	22
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				94	100
cM capacity (veh/h)	1582				875	1055

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	97	30	51
Volume Left	1	0	50
Volume Right	0	16	1
cSH	1582	1700	878
Volume to Capacity	0.00	0.02	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.1	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay		2.7	
Intersection Capacity Utilization		15.4%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

3: Stanley Road & US 25W

11/30/2007



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	9	75	123	1014	971	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	82	134	1102	1055	21
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	1					
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1884	538	1076			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1884	538	1076			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	83	79			
cM capacity (veh/h)	49	488	644			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	91	134	551	551	704	372
Volume Left	10	134	0	0	0	0
Volume Right	82	0	0	0	0	21
cSH	462	644	1700	1700	1700	1700
Volume to Capacity	0.20	0.21	0.32	0.32	0.41	0.22
Queue Length 95th (ft)	18	19	0	0	0	0
Control Delay (s)	22.5	12.1	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	22.5	1.3	0.0			
Approach LOS	C					

Intersection Summary						
Average Delay			1.5			
Intersection Capacity Utilization			47.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Stanley Road & Proposed Street

11/30/2007



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	
Volume (veh/h)	1	70	34	53	30	1
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)	1	76	37	58	33	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	95				144	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95				144	66
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	100
cM capacity (veh/h)	1499				848	998

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	77	95	34
Volume Left	1	0	33
Volume Right	0	58	1
cSH	1499	1700	852
Volume to Capacity	0.00	0.06	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.1	0.0	9.4
Lane LOS	A		A
Approach Delay (s)	0.1	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		15.0%	ICU Level of Service A
Analysis Period (min)		15	

TABLE 4A

LEFT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

(If the left-turn volume exceeds the table value a left -turn lane is needed)

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	100 - 149	150 - 199	200 - 249	250 - 299	300 - 349	350 - 399
100 - 149	300	235	185	145	120	100
150 - 199	245	200	160	130	110	90
200 - 249	205	170	140	115	100	80
250 - 299	175	150	125	105	90	70
300 - 349	155	135	110	95	80	65
350 - 399	135	120	100	85	70	60
400 - 449	120	105	90	75	65	55
450 - 499	105	90	80	70	60	50
500 - 549	95	80	70	65	55	50
550 - 599	85	70	65	60	50	45
600 - 649	75	65	60	55	45	40
650 - 699	70	60	55	50	40	35
700 - 749	65	55	50	45	35	30
750 or More	60	50	45	40	35	30

OPPOSING VOLUME	THROUGH VOLUME PLUS RIGHT-TURN VOLUME *					
	350 - 399	400 - 449	450 - 499	500 - 549	550 - 599	= / > 600
100 - 149	100	80	70	60	55	50
150 - 199	90	75	65	55	50	45
200 - 249	80	72	60	55	50	45
250 - 299	70	65	55	50	45	40
300 - 349	65	60	50	50	45	40
350 - 399	60	55	50	45	40	40
400 - 449	55	50	45	45	40	35
450 - 499	50	45	45	40	35	35
500 - 549	50	45	40	40	35	35
550 - 599	45	40	40	35	35	35
600 - 649	40	35	35	35	35	30
650 - 699	35	35	35	30	30	30
700 - 749	30	30	30	30	30	30
750 or More	30	30	30	30	30	30

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

TABLE 4B
RIGHT-TURN LANE VOLUME THRESHOLDS
FOR TWO-LANE ROADWAYS WITH A PREVAILING SPEED OF 35 MPH OR LESS

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

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 50 - 99					Yes	Yes Yes
100 - 149 150 - 199			Yes	Yes Yes	Yes Yes	Yes Yes
200 - 249 250 - 299	Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
300 - 349 350 - 399	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
400 - 449 450 - 499	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
500 - 549 550 - 599	Yes Yes	Yes Yes	Yes Yes	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.

WILBUR SMITH ASSOCIATES, INC.

Alexander Place
1100 Marion Street, Suite 200
Knoxville, TN 37921

Traffic Counts

File Name : CLINTO~1
Site Code : 11202007
Start Date : 11/20/2007
Page No : 1

Groups Printed- Unshifted

Start Time	Clinton Hwy Southbound				Westbound				Clinton Hwy Northbound				Stanley Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
07:00 AM	1	167	0	168	0	0	0	0	0	108	8	116	24	0	3	27	311
07:15 AM	2	216	0	218	0	0	0	0	0	146	4	150	30	0	2	32	400
07:30 AM	1	232	0	233	0	0	0	0	0	150	7	157	10	0	0	10	400
07:45 AM	3	216	0	219	0	0	0	0	0	131	8	139	12	0	1	13	371
Total	7	831	0	838	0	0	0	0	0	535	27	562	76	0	6	82	1482
08:00 AM	1	118	0	119	0	0	0	0	0	124	4	128	14	0	3	17	264
08:15 AM	0	149	0	149	0	0	0	0	0	128	6	134	14	0	2	16	299
08:30 AM	1	152	0	153	0	0	0	0	0	126	7	133	3	0	1	4	290
08:45 AM	1	153	0	154	0	0	0	0	0	104	3	107	7	0	2	9	270
Total	3	572	0	575	0	0	0	0	0	482	20	502	38	0	8	46	1123
*** BREAK ***																	
11:00 AM	2	131	0	133	0	0	0	0	0	123	6	129	9	0	2	11	273
11:15 AM	1	142	0	143	0	0	0	0	0	126	10	136	9	0	2	11	290
11:30 AM	0	137	0	137	0	0	0	0	0	117	10	127	8	0	0	8	272
11:45 AM	2	124	0	126	0	0	0	0	0	131	3	134	8	0	1	9	269
Total	5	534	0	539	0	0	0	0	0	497	29	526	34	0	5	39	1104
12:00 PM	2	133	0	135	0	0	0	0	0	119	6	125	4	0	2	6	266
12:15 PM	1	137	0	138	0	0	0	0	0	126	9	135	3	0	0	3	276
12:30 PM	2	114	0	116	0	0	0	0	0	119	8	127	7	0	1	8	251
12:45 PM	3	136	0	139	0	0	0	0	0	149	6	155	9	0	1	10	304
Total	8	520	0	528	0	0	0	0	0	513	29	542	23	0	4	27	1097
*** BREAK ***																	
02:00 PM	3	145	0	148	0	0	0	0	0	116	2	118	6	0	6	12	278
02:15 PM	3	116	0	119	0	0	0	0	0	160	9	169	8	0	3	11	299
02:30 PM	0	163	0	163	0	0	0	0	0	145	13	158	15	0	1	16	337
02:45 PM	4	164	0	168	0	0	0	0	0	184	17	201	4	0	0	4	373
Total	10	588	0	598	0	0	0	0	0	605	41	646	33	0	10	43	1287
03:00 PM	1	141	0	142	0	0	0	0	0	146	17	163	14	0	0	14	319
03:15 PM	0	147	0	147	0	0	0	0	0	168	23	191	13	0	0	13	351
03:30 PM	2	216	0	218	0	0	0	0	0	163	21	184	13	0	3	16	418
03:45 PM	3	186	0	189	0	0	0	0	0	192	6	198	15	0	2	17	404
Total	6	690	0	696	0	0	0	0	0	669	67	736	55	0	5	60	1492
04:00 PM	1	181	0	182	0	0	0	0	0	197	19	216	15	0	4	19	417
04:15 PM	0	187	0	187	0	0	0	0	0	208	11	219	11	0	0	11	417
04:30 PM	0	190	0	190	0	0	0	0	0	217	19	236	12	0	2	14	440
04:45 PM	2	232	0	234	0	0	0	0	0	206	12	218	11	0	1	12	464
Total	3	790	0	793	0	0	0	0	0	828	61	889	49	0	7	56	1738
05:00 PM	6	201	0	207	0	0	0	0	0	258	14	272	9	0	0	9	488
05:15 PM	1	232	0	233	0	0	0	0	0	233	20	253	11	0	0	11	497
05:30 PM	2	235	0	237	0	0	0	0	0	251	22	273	14	0	4	18	528
05:45 PM	4	234	0	238	0	0	0	0	0	200	14	214	11	0	2	13	465
Total	13	902	0	915	0	0	0	0	0	942	70	1012	45	0	6	51	1978
Grand Total	55	5427	0	5482	0	0	0	0	0	5071	344	5415	353	0	51	404	11301
Approch %	1	99	0		0	0	0		0	93.6	6.4		87.4	0	12.6		
Total %	0.5	48	0	48.5	0	0	0	0	0	44.9	3	47.9	3.1	0	0.5	3.6	

WILBUR SMITH ASSOCIATES, INC.

Alexander Place
1100 Marion Street, Suite 200
Knoxville, TN 37921

Traffic Counts

File Name : Stanley Rd with Subdivision
Site Code : 11202007
Start Date : 11/20/2007
Page No : 1

Groups Printed- Unshifted

Start Time	Subdivision Southbound				Stanley Rd Westbound				Northbound				Stanley Rd Eastbound				Int. Total
	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
07:00 AM	0	0	18	18	5	4	0	9	0	0	0	0	0	27	0	27	54
07:15 AM	0	0	26	26	5	1	0	6	0	0	0	0	0	32	0	32	64
07:30 AM	0	0	4	4	4	4	0	8	0	0	0	0	0	10	0	10	22
07:45 AM	0	0	10	10	8	3	0	11	0	0	0	0	0	13	0	13	34
Total	0	0	58	58	22	12	0	34	0	0	0	0	0	82	0	82	174
08:00 AM	0	0	11	11	5	0	0	5	0	0	0	0	0	17	0	17	33
08:15 AM	0	0	10	10	6	0	0	6	0	0	0	0	0	16	0	16	32
08:30 AM	0	0	4	4	4	4	0	8	0	0	0	0	0	4	0	4	16
08:45 AM	0	0	9	9	2	2	0	4	0	0	0	0	0	9	0	9	22
Total	0	0	34	34	17	6	0	23	0	0	0	0	0	46	0	46	103
*** BREAK ***																	
11:00 AM	0	0	10	10	6	2	0	8	0	0	0	0	0	11	0	11	29
11:15 AM	1	0	7	8	5	6	0	11	0	0	0	0	0	11	0	11	30
11:30 AM	1	0	7	8	4	6	0	10	0	0	0	0	0	8	0	8	26
11:45 AM	0	0	5	5	4	1	0	5	0	0	0	0	0	9	0	9	19
Total	2	0	29	31	19	15	0	34	0	0	0	0	0	39	0	39	104
12:00 PM	0	0	6	6	3	5	0	8	0	0	0	0	0	6	0	6	20
12:15 PM	0	0	3	3	6	4	0	10	0	0	0	0	0	3	0	3	16
12:30 PM	0	0	7	7	7	3	0	10	0	0	0	0	0	8	0	8	25
12:45 PM	0	0	10	10	8	1	0	9	0	0	0	0	0	10	0	10	29
Total	0	0	26	26	24	13	0	37	0	0	0	0	0	27	0	27	90
*** BREAK ***																	
02:00 PM	1	0	7	8	1	4	0	5	0	0	0	0	0	12	0	12	25
02:15 PM	0	0	12	12	7	5	0	12	0	0	0	0	0	11	0	11	35
02:30 PM	0	0	15	15	7	6	0	13	0	0	0	0	0	16	0	16	44
02:45 PM	0	0	5	5	15	6	0	21	0	0	0	0	0	4	0	4	30
Total	1	0	39	40	30	21	0	51	0	0	0	0	0	43	0	43	134
03:00 PM	0	0	12	12	12	6	0	18	0	0	0	0	0	14	1	15	45
03:15 PM	0	0	12	12	12	11	0	23	0	0	0	0	0	13	0	13	48
03:30 PM	0	0	17	17	16	7	0	23	0	0	0	0	0	16	0	16	56
03:45 PM	1	0	14	15	5	4	0	9	0	0	0	0	0	17	0	17	41
Total	1	0	55	56	45	28	0	73	0	0	0	0	0	60	1	61	190
04:00 PM	0	0	12	12	11	9	0	20	0	0	0	0	0	19	0	19	51
04:15 PM	0	0	11	11	10	1	0	11	0	0	0	0	0	11	0	11	33
04:30 PM	1	0	11	12	11	8	0	19	0	0	0	0	0	14	0	14	45
04:45 PM	0	0	5	5	10	4	0	14	0	0	0	0	0	12	0	12	31
Total	1	0	39	40	42	22	0	64	0	0	0	0	0	56	0	56	160
05:00 PM	1	0	6	7	14	6	0	20	0	0	0	0	0	9	0	9	36
05:15 PM	0	0	6	6	13	8	0	21	0	0	0	0	0	11	1	12	39
05:30 PM	0	0	13	13	18	6	0	24	0	0	0	0	0	18	0	18	55
05:45 PM	0	0	11	11	7	11	0	18	0	0	0	0	0	13	1	14	43
Total	1	0	36	37	52	31	0	83	0	0	0	0	0	51	2	53	173
Grand Total	6	0	316	322	251	148	0	399	0	0	0	0	0	404	3	407	1128
Apprch %	1.9	0	98.1		62.9	37.1	0		0	0	0		0	99.3	0.7		
Total %	0.5	0	28	28.5	22.3	13.1	0	35.4	0	0	0	0	0	35.8	0.3	36.1	

