TRAFFIC IMPACT STUDY

BRADLEY PARK
Savannah, Georgia

GEORGIA REGISTERED NO. 31437 PROFESSIONAL ENGINEER ERIC J. TRIPI

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October 2007

Traffic Impact Study
for
Proposed Bradley Park Development
Savannah, Georgia

Prepared for:

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Prepared by:

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1.
Executive Summary

This report summarizes the results of a traffic impact study conducted by Wilbur Smith Associates for the proposed Bradley Park development in Savannah, Georgia. This traffic analysis evaluated the impact of the Bradley Park site traffic on the area roadways and determined the roadway and operational improvements necessary to accommodate the site traffic.

The Bradley Park development is located on the south side of US Highway 17, along both sides of Bradley Boulevard. The site is proposed to contain 300 apartments and 20 acres of commercial use and is projected to be built in two phases. The first phase is proposed to contain all of the residential units, about thirty-percent of the commercial land use, and is planned to be completed by 2009. The site will be built-out completely by 2019. Access for the site is proposed via one access point on US-17 and one access point on Bradley Boulevard.

The results of the traffic study can be summarized as follows:

- The site will generate 848 new A.M. peak hour trips, 863 new P.M. peak hour trips, and 6,710 new daily trips.
- *Under 2009 background traffic conditions (without the addition of site traffic)*, the following roadway improvement is recommended:
    - Construct a dedicated right-turn lane on eastbound US-17 at Bradley Boulevard.
- *Under 2019 background traffic conditions (without the addition of site traffic)*, significant roadway improvements would be required to accommodate the traffic generated by the background developments and the inherent growth in traffic in the study area. The improvements are listed below:
    - One additional lane on US-17 in each direction between Bradley Boulevard and Southwest Middle School Drive; two additional lanes on US-17 in each direction east of Southwest Middle School Drive resulting in four lanes on US-17 in each direction.
    - Signalization of US-17/Bradley Boulevard, US-17/Canebrake Road and US-17/Southwest Middle School Drive intersections.

  - Dual right-turn lanes on northbound Bradley Boulevard at US-17 intersection and protected/overlap phase for the right-turn movement.
  - Separate left-turn lane and shared through/right-turn lanes for southbound Fords Pointe Entrance, Southwest Middle School Drive, and northbound Salt Grass Drive at Walmart.

- *Under 2019 future traffic conditions (with the addition of site traffic)*, the following roadway improvements are recommended:

  - Construct a right-turn lane on eastbound US-17 at the Site Drive;
  - Restripe existing westbound U-turn lane on US-17 at the Site Drive to provide a dedicated westbound left turn lane on US-17.
  - Construct a left-turn lane on southbound Bradley Boulevard at the Site Drive;
  - Construct a right-turn lane on southbound Bradley Boulevard at the Site Drive;

Based on the results of this analysis and the roadway improvements recommended above, the area roadways will be able to adequately accommodate the Bradley Park development site traffic.

2.
Existing Traffic Conditions

Introduction

The Bradley Park development is located on the south side of US Highway 17, along both sides of Bradley Boulevard in Savannah, Georgia. Figure 1 illustrates the site location. The proposed development at build-out will consist of 300 apartments and 30 acres of commercial use which will be developed over two phases. The first phase is proposed to contain all of the residential units, about thirty-percent of the commercial land use, and is planned to be completed by 2009. The site will be built-out completely by 2019. This study was conducted to assess the impact of the site on the adjacent street system.

Area Road Network

The major roadways providing access to the site are US-17, Bradley Boulevard, and Canebrake Road. Chevis Road, the Southwest Middle School Drive and the Wal-Mart Main Entrance Drive were also analyzed in this study. These roadways are described in the following paragraphs:

US-17 is an east-west four-lane divided highway in the site vicinity. US-17 is under the jurisdiction of the Georgia Department of Transportation (GDOT) and has a posted speed limit of 45 mph near the site which reduces to 35 mph near the Southwest Middle School and again increases to 45 mph east of Chevis Road. A 2006 average daily traffic (ADT) count provided by the GDOT showed that US-17 in the site vicinity was carrying about 19,090 vehicles per day (vpd).

Bradley Boulevard is a local north-south, two-lane roadway in the site vicinity. It primarily serves the Bradley Point South residential development and has a posted speed limit of 30 mph. North of its intersection with US-17, it becomes the main entrance to the Fords Pointe residential development. Its intersection with US-17 is unsignalized and is controlled by stop signs on Bradley Boulevard and Fords Pointe Entrance Drive.

SITE LOCATION MAP

Bradley Park: Savannah, GA

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Figure 1

Canebrake Road is a northwest-southeast, two-lane roadway in the site vicinity. The roadway is under the jurisdiction of Chatham County and has a posted speed limit of 35 mph in the site vicinity. Its intersection with US-17 is controlled by a stop sign on Canebrake Road.

Chevis Road is a north-south, two-lane roadway in the site vicinity. The roadway is under the jurisdiction of Chatham County and has a posted speed limit of 40 mph in the site vicinity. Its intersection with US-17 is controlled by a traffic signal. Opposite of Chevis Road is an entrance to the Southwest Middle School.

Southwest Middle School Drive is a north-south two-lane local drive primarily serving the Southwest Middle School located north of US-17. Its intersection with US-17 is unsignalized.

Wal-Mart Drive is a north-south local three-lane roadway which serves the Wal-Mart store located north of US-17. Its intersection with US-17 is signalized.

Planned Roadway Improvements

Based on discussions with the GDOT there are no planned roadway improvement in the site vicinity. The are preliminary plans to coordinate the traffic signals installed on US-17 at Chevis Road and at Wal-Mart Entrance Drive; however, there is no scheduled timeline for this improvement.

Site Accessibility

The site is proposed to be served by one access drive on US-17 and one access drive on Bradley Boulevard. The site drive on US-17 is proposed to be aligned with Canebrake Road.

Existing Traffic Volumes and Conditions

A field reconnaissance was conducted of the site and its environs to obtain a database of existing conditions. The peak periods for the proposed use would typically occur during weekday mornings and afternoons. Based on discussions with the Chatham County-Savannah Metropolitan Planning Commission, five intersections were identified to be studied:

- US-17/Bradley Boulevard
- US-17/Canebrake Road
- US-17/Southwest Middle School Drive
- US-17/Chevis Road
- US-17/Wal-Mart Main Entrance Drive

Traffic turning movement counts were conducted at the study intersections as follows:

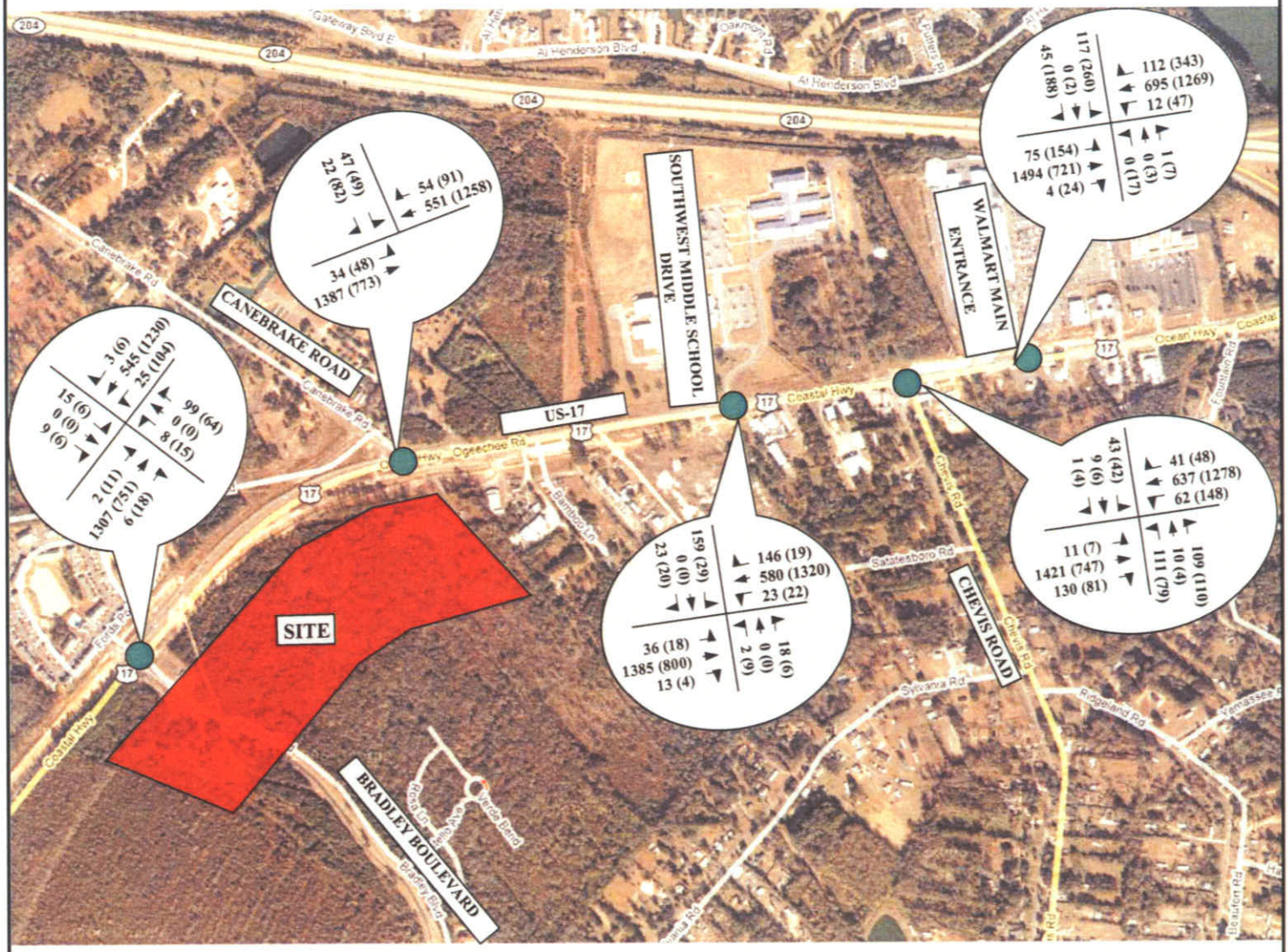
- US-17/Bradley Boulevard – Thursday, July 19th, 2007
- US-17/Canebrake Road – Wednesday, July 18th, 2007
- US-17/Southwest Middle School Drive – Tuesday, July 17th, 2007
- US-17/Chevis Road – Tuesday, July 17th, 2007
- US-17/Wal-Mart Main Entrance Drive – Tuesday, July 17th, 2007

Turning movement counts were performed at the study intersections between 7:00-9:00 A.M. and 4:00-6:00 P.M. These hours represent the peak periods for traffic during an average weekday. The peak hours were found to be 7:00 A.M.-8:00 A.M. and 4:45 P.M.-5:45 P.M.

Since the traffic counts, were not performed during school times, additional counts were performed to account for school traffic. These additional counts were performed as follows:

- US-17/Southwest Middle School Drive –Tuesday, September 11th, 2007
- US-17/Chevis Road –Tuesday, September 11th, 2007

The traffic volumes at other study intersections were updated based on these September counts to account for the school-generated traffic. The existing adjusted peak-hour traffic volumes are illustrated on Figure 2. The traffic count data sheets can be found in Appendix A.



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2007 EXISTING TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 2

3.
Background Traffic Conditions

The Bradley Park development is expected to be completed in two phases. The first phase is proposed to be completed by 2009 with complete build-out by 2019. Therefore it was necessary to establish background traffic conditions for the years 2009 and 2019.

Background traffic takes into account the following items:

A. The additional traffic on the roadway system that will be generated by approved developments in the area that may be completed by the time the build-out of the site occurs;

B. Traffic generated by other developments not known at this time;

C. The inherent growth in traffic.

Item A above was addressed by conferring with the MPC. Based on these discussions, it was determined that there were three approved developments to consider in the site vicinity. These developments are as follows:

1. Bradley Point South – located south of US-17 along Bradley Boulevard
2. Salt Grass Plaza – located south of US-17 across from the existing Wal-Mart
3. Vallambrosa Development – located south of US-17 and southwest of Chevis Road

The trips generated by the Bradley Point South development were based on discussions with the architecture/engineering firm associated with the development. Based on these discussions, it was determined that Bradley Point South is currently partially developed and is generating traffic. About 250 additional single family homes and 144 apartments are proposed to be built by 2019. Out of the 250 proposed single family homes, about 100 are proposed to be built within the next 2 years (by 2009).

Salt Grass Plaza is a commercial development and will be generating traffic by 2009. It will consist of 14,000 square feet of Specialty Retail with four out-parcels. Based on discussions with the MPC it was determined that the out-parcels would consist of about 8,400 square feet of small Specialty Retail, two restaurants, and a bank. The number of trips generated by the development was estimated based on the trip generation data for

commercial developments contained in "*Trip Generation, 7th Edition*", a manual published by the Institute of Transportation Engineers (ITE).

The trips generated by the Vallambrosa development were based on discussions with the MPC and also based on a trip generation study performed by WSA dated July 25th, 2007. The Vallambrosa Development is proposed to be built-out by 2017. The development will consist of several different land uses including residential and commercial developments.

The trips for the background developments for 2009 and 2019 are listed in Table 1 and Table 2, respectively.

Table 1
PROJECTED 2009 BACKGROUND DEVELOPMENT PEAK HOUR VOLUMES

Development	Proposed Development Land uses by 2009	A.M. Peak-Hour Trips			P.M. Peak-Hour Trips		
		In	Out	Total	In	Out	Total
Bradley Point South	100 Single Family Homes	20	59	79	67	40	107
Salt Grass Plaza	14,900 sf Specialty Retail	31	19	50	25	32	57
	8,400 sf Specialty Retail	21	14	35	18	24	42
	8,400 sf High-Turnover Sit Down Restaurant (2)	100	94	194	112	72	184
	4,300 sf Bank	48	35	83	110	110	220
	Total Trips	**200**	**162**	**362**	**265**	**238**	**503**
	Total Pass-By Trips (34%)	(-68)	(-55)	(-123)	(-90)	(-81)	-(171)
	Total Development New Trips	**132**	**107**	**239**	**175**	**157**	**332**
	Total Development Trips [(1)]	***200***	***162***	***362***	***265***	***238***	***503***
Total Background Development Trips [(1)]		**220**	**221**	**441**	**332**	**278**	**610**

(1) Includes Pass-By Trips

Table 2
PROJECTED 2019 BACKGROUND DEVELOPMENT PEAK HOUR VOLUMES

Development	Proposed Development Land uses between 2009 and 2019	A.M. Peak-Hour Trips			P.M. Peak-Hour Trips		
		In	Out	Total	In	Out	Total
Bradley Point South	150 Single Family Homes	29	85	114	97	57	154
	144 Apartments	15	59	74	63	34	97
	Total Development Trips	***44***	***144***	***188***	***160***	***91***	***251***
Vallambrosa Plantation	1,804 Single-Family Homes	318	954	1,272	912	536	1,448
	1,530 Condominiums/Townhouses	76	382	458	377	186	563
	Total Residential Trips	**394**	**1,336**	**1,730**	**1,289**	**722**	**2,011**
	Shared Trips	(-19)	(-17)	(-36)	(-23)	(-19)	(-42)
	Total New Residential Trips	**375**	**1,319**	**1,694**	**1,266**	**703**	**1,969**
	20,000 SF General Office	46	6	52	17	84	101
	Shared Trips	(-5)	(-1)	(-6)	(-5)	(-4)	(-9)
	New Office Trips	**41**	**5**	**46**	**12**	**80**	**92**
	60,000 SF of Specialty Retail[(1)]	70	45	115	73	92	165
	20,000 SF High Turnover (Sit-Down) Restaurant	120	110	230	133	85	218
	Total Commercial Trips	**190**	**155**	**345**	**206**	**177**	**383**
	Shared Trips	(-23)	(-30)	(-53)	(-29)	(-33)	(-62)
	Pass-By Trips (34%)	(-57)	(-43)	(-100)	(-60)	(-49)	(-109)
	Total New Commercial Trips	**110**	**82**	**192**	**117**	**95**	**212**
	18-Hole Golf Course	32	8	40	22	27	49
	New Golf Course Trips	**32**	**8**	**40**	**22**	**27**	**49**
	268 Room Hotel	85	54	139	84	74	158
	300 Room Hotel	98	62	160	94	83	177
	Total Hotel Trips	**183**	**116**	**299**	**178**	**157**	**335**
	Shared Trips	(-6)	(-5)	(-11)	(-7)	(-6)	(-13)
	Total New Hotel Trips	**177**	**111**	**288**	**171**	**151**	**322**
	Total New Development Trips	**735**	**1,525**	**2,260**	**1,588**	**1,056**	**2,644**
	Total Pass-By Trips	**(57)**	**(43)**	**(100)**	**(60)**	**(49)**	**(109)**
	Total Development Trips [(1)]	**792**	**1,568**	**2,360**	**1,648**	**1,105**	**2,753**
Total Background Development Trips [(1)]		**836**	**1,712**	**2,548**	**1,808**	**1,196**	**3,004**

(1) Includes Pass-By Trips

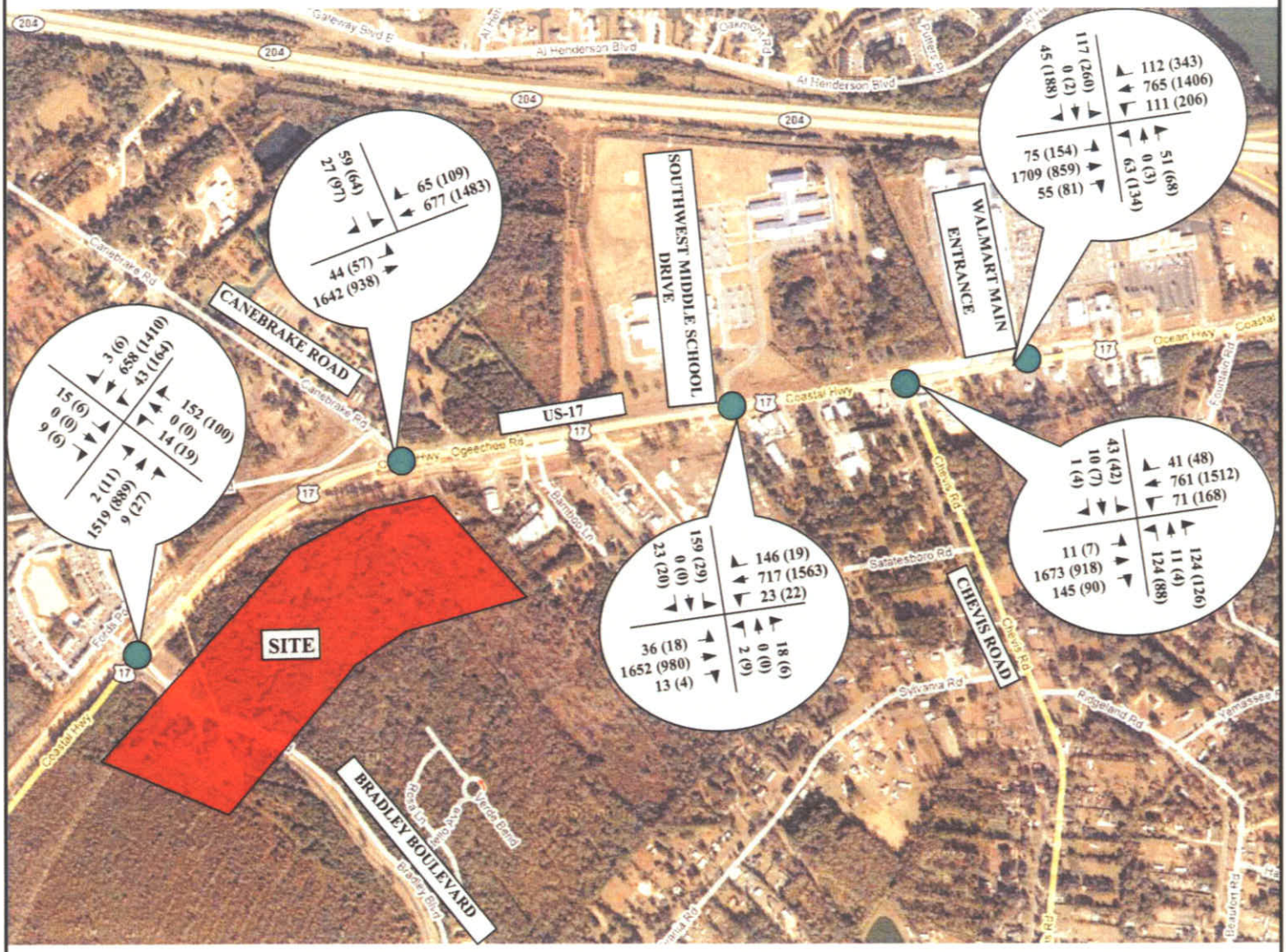
The Bradley Point South and Salt Grass Plaza development trips shown in Table 1 and Table 2 were assigned to the area roadways based on the directional distribution described in later in this report.

The trips generated by the Vallambrosa development were distributed according to the direction distribution shown in Table 3.

Table 3
ESTIMATED DIRECTIONAL DISTRIBUTION OF VALLAMBROSA TRIPS

Direction To/from	Residential Trip %	Commercial Trip %
East on US-17	67	45
West on US-17	10	25
North on Canebrake Road	3	5
North on Chevis/East on US-17	5	5
South on Chevis Road/Wild Heron Road	15	20
Total	**100%**	**100%**

To account for the background traffic conditions in Items B and C over the next two years (2009) and 10 years thereafter (2019), growth factors were applied to the existing traffic volumes shown on Figure 2. Based on discussions with the MPC, a growth rate of 5.5% per year was applied to the 2007 existing traffic volumes for two years to obtain the 2009 traffic volumes. Thereafter, a growth rate of 4.2% per year was applied for 10 years to obtain the 2019 traffic volumes. The assigned background development volumes were then added to the 2009 traffic volumes and 2019 traffic volumes to create the 2009 Background traffic scenario and 2019 Background traffic scenario. The 2009 and 2019 Background peak hour traffic volumes are illustrated on Figures 3 and 4 respectively.



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

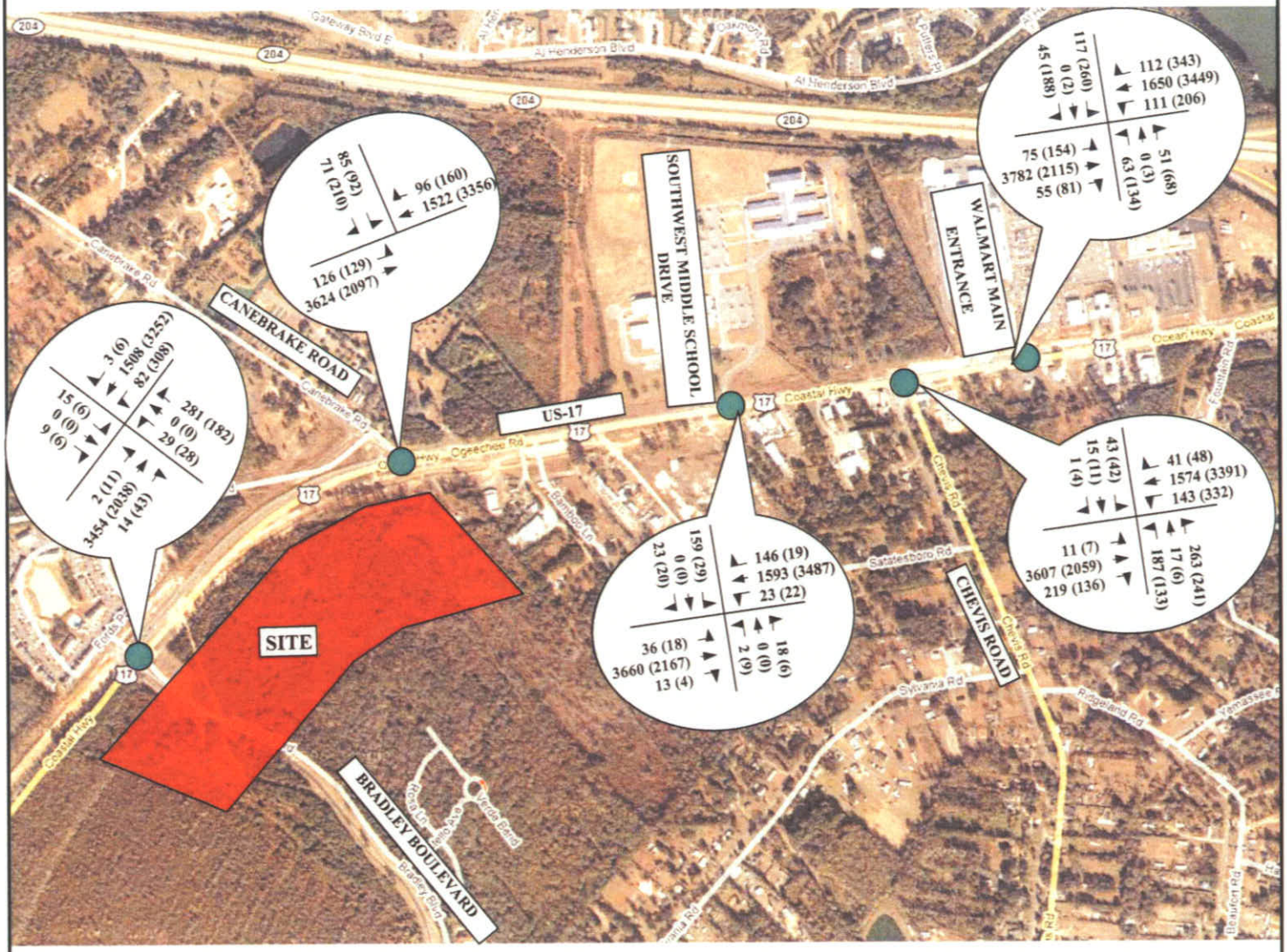
XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2009 BACKGROUND TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 3



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2019 BACKGROUND TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 4

4.
Site-Generated Traffic

Trip Generation

The Bradley Park development is proposed to contain 300 apartments and 20 acres of commercial use. At complete build-out of the site (by 2019) the commercial portion of the site is proposed to contain a 60,000 square-foot office, 30,000 square feet of retail use, a 4,000 square-foot convenience store, two 2,000 square-foot fast food restaurants, a 5,000 square-foot sit-down restaurant, and a 4,500 square-foot bank. Phase I build-out of the site (by 2009) is proposed contain all of the residential units (300 apartments) and about 30-percent of the total commercial land use.

The number of trips generated by the development was estimated based on the trip generation data for residential and commercial developments contained in "*Trip Generation, 7th Edition*".

When considering retail and commercial uses in a mixed-use development such as Bradley Park, pass-by and shared trips (also known as captured trips) need to be considered. Pass-by trips are defined as "trips made as intermediate stops on the way from an origin to a primary trip destination. Pass-by trips are attracted from traffic passing the site on an adjacent street that contains direct access to the generator" (*ITE's Trip Generation*). Pass-by trips are not new trips.

Shared or captured trips are defined as internal trips generated by the site which are not made on the major street system. At Bradley Park for example, it would represent trips made between the residential and commercial portions of the site only using the roadways internal to the site (i.e., *not using US-17 or Bradley Boulevard).*

The pass-by and shared trips percentages for the development were determined based on information contained in the *Trip Generation Handbook, An ITE Proposed Recommended Practice.* This handbook was utilized in order to calculate the pass-by trips for the commercial uses and the shared trip percentages between the residential and commercial uses of the site. The pass-by trip percentage during the A.M and P.M. peak-hours was determined to be 34-percent for the retail uses. Even though some of the individual uses were calculated to have higher pass-by rates, to be conservative, a maximum pass-by rate of 34-percent was used. The shared trip percentage was calculated to be about 11-percent of the total trips generated by the site during the A.M. and 12-percent during the

P.M. peak-hours for Phase I build-out of the site. For complete build-out of the site, the shared trip percentage was calculated to be about 10-percent of the total trips generated by the site during the A.M. peak hour and 16-percent during the P.M. peak-hour.

The projected peak-hour site-generated traffic volumes including pass-by and shared trips for Phase I build-out (2009) and Complete build-out (2019) of the site are shown in Tables 4 and 5, respectively.

Table 4
SITE TRIP GENERATION – Phase I (2009)

% Build-Out	ITE Code	Size	A.M. Peak Hour			P.M. Peak Hour		
			In	Out	Total	In	Out	Total
100	220	300 Apartments	30	121	151	119	64	183
		Shared Trips	(-9)	(-9)	(-18)	(-13)	(-10)	(-23)
		New Residential Trips	**21**	**112**	**133**	**106**	**54**	**160**
30	710	60,000 SF General Office	33	5	38	8	36	44
		Shared Trips	(-3)	(-1)	(-4)	(-2)	(-3)	(-5)
		New Office Trips	**30**	**4**	**34**	**6**	**33**	**39**
30	814	30,000 SF of Sp. Retail[(1)]	14	9	23	12	16	28
	851	4,000 SF Convien. Store	40	40	80	32	31	63
	934	2,000 SF Fast Food Res. (2)	32	31	63	22	20	42
	932	5,000 SF Restaurant	9	8	17	10	6	16
	912	4,500 SF Drive-in Bank	9	8	17	31	31	62
		Total Commercial Trips	**104**	**96**	**200**	**107**	**104**	**211**
		Shared Trips	(-10)	(-12)	(-22)	(-12)	(-14)	(-26)
		Pass-By Trips (34%)	(-32)	(-29)	(-61)	(-32)	(-31)	(-63)
		Total New Commercial Trips	**62**	**55**	**117**	**63**	**59**	**122**
		Total New Development Trips	**113**	**171**	**284**	**175**	**146**	**321**
		Total Development Trips [(2)]	**145**	**200**	**345**	**207**	**177**	**384**

[(1)] The A.M. trip generation was based on the Shopping Center (ITE 820) land use since no A.M. trip generation data exists for the Specialty Retail (ITE 814) land use.
[(2)] Includes Pass-By Trips

The site is expected to generate 3,320 new trips per day at the build-out of Phase I (2009).

Table 5
SITE TRIP GENERATION – Build Out (2019)

% Build-Out	ITE Code	Size	A.M. Peak Hour			P.M. Peak Hour		
			In	Out	Total	In	Out	Total
100	220	300 Apartments	30	121	151	119	64	183
		Shared Trips	(-9)	(-31)	(-40)	(-39)	(-32)	(-71)
		New Residential Trips	**21**	**90**	**111**	**80**	**32**	**112**
	710	60,000 SF General Office	110	15	125	25	121	146
		Shared Trips	(-6)	(-3)	(-9)	(-7)	(-9)	(-16)
		New Office Trips	**104**	**12**	**116**	**18**	**112**	**130**
	814	30,000 SF of Sp. Retail[1]	46	30	76	41	53	94
	851	4,000 SF Convien. Store	134	134	268	107	103	210
	934	2,000 SF Fast Food Res. (2)	108	104	212	72	67	139
	932	5,000 SF Restaurant	30	28	58	34	21	55
	912	4,500 SF Drive-in Bank	31	25	56	103	103	206
		Total Commercial Trips	**349**	**321**	**670**	**357**	**347**	**704**
		Shared Trips	(-34)	(-15)	(-49)	(-39)	(-44)	(-83)
		Pass-By Trips (34%)	(-107)	(-104)	(-211)	(-108)	(-103)	(-211)
		Total New Commercial Trips	**208**	**202**	**410**	**210**	**200**	**410**
		Total New Development Trips	**333**	**304**	**637**	**308**	**344**	**652**
		Total Development Trips [2]	**440**	**408**	**848**	**416**	**447**	**863**

[1] The A.M. trip generation was based on the Shopping Center (ITE 820) land use since no A.M. trip generation data exists for the Specialty Retail (ITE 814) land use.
[2] Includes Pass-By Trips

The site is expected to generate 6,710 new trips per day at complete build-out (2019).

Trip Distribution

The direction from which traffic will approach and depart the site was determined by an analysis of existing traffic patterns at the study intersections and the site layout. This analysis resulted in the directions of approach shown in Table 6.

Table 6
ESTIMATED DIRECTIONAL DISTRIBUTION OF SITE TRIPS

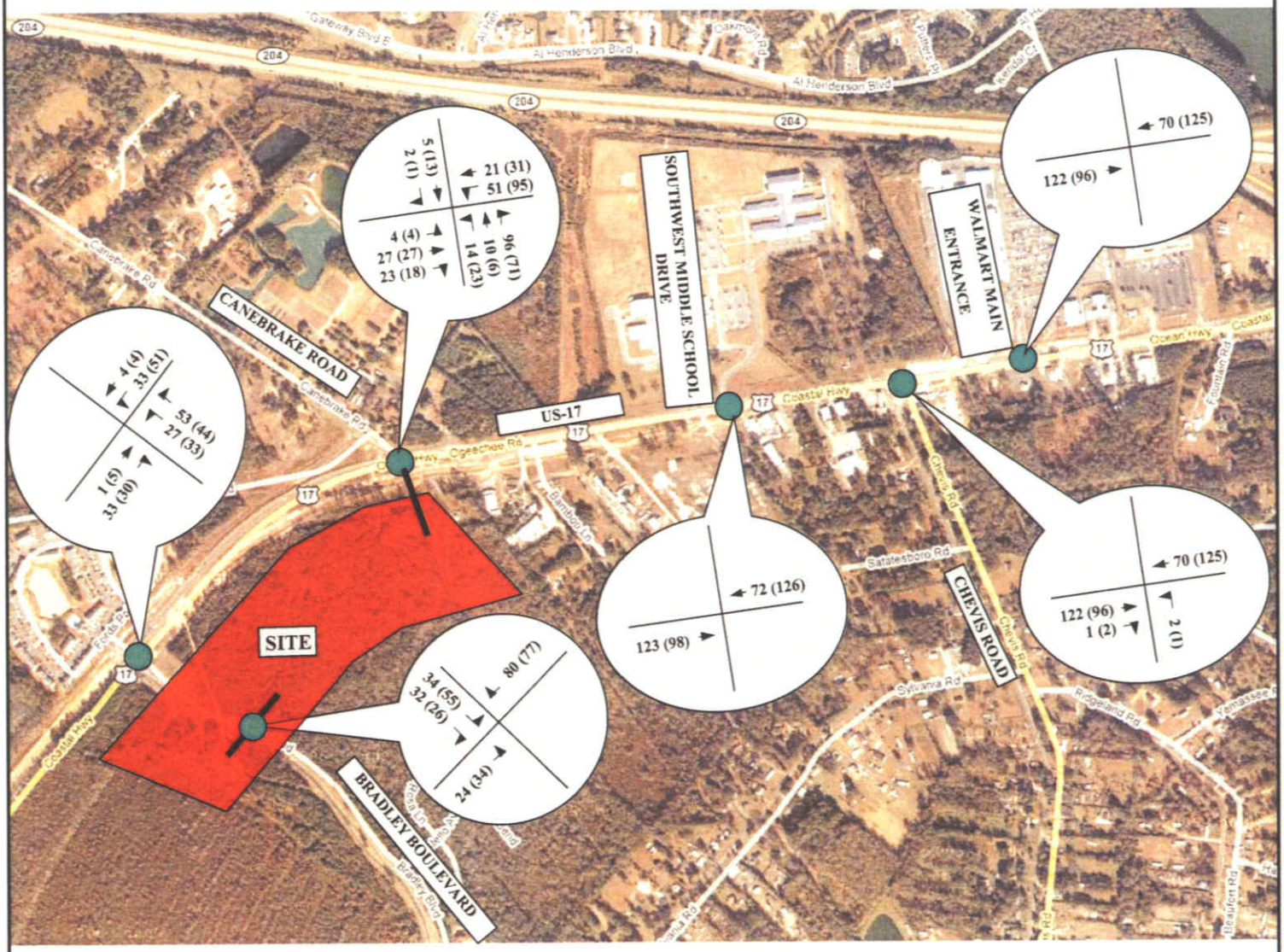
Direction To/from	Residential Trip %	Commercial Trip %
East on US-17	80	58
West on US-17	10	35
North on Canebrake Road	10	5
South on Chevis Road	-	2
Total	**100%**	**100%**

Trip Assignment

The projected peak hour traffic volumes shown in Tables 4 and 5 were assigned to the adjacent street system based on the estimated directional distribution discussed above in Table 6 and the logical routes drivers would take based on the site layout. The site-generated trips for Phase I and complete build-out are illustrated on Figures 5 and 6.

The site-generated peak hour traffic volumes on Figure 5 were then added to the 2009 Background peak hour traffic volumes on Figure 3 to determine the total 2009 Future peak hour traffic volumes shown on Figure 7.

The site-generated peak hour traffic volumes on Figure 6 were then added to the 2019 Background peak hour traffic volumes on Figure 4 to determine the total 2019 Future peak hour traffic volumes shown on Figure 8.



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

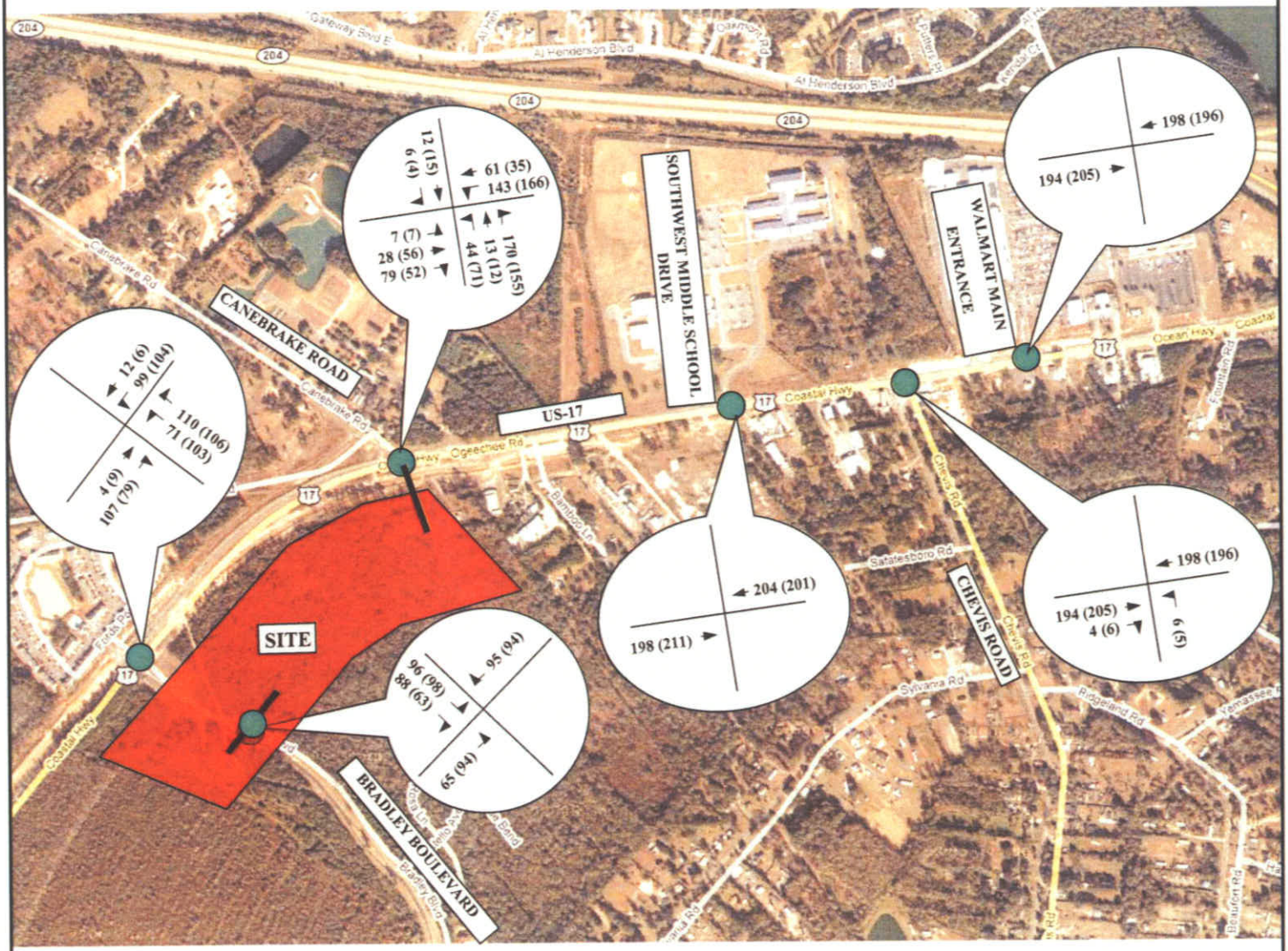
XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2009 PHASE I SITE GENERATED TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 5

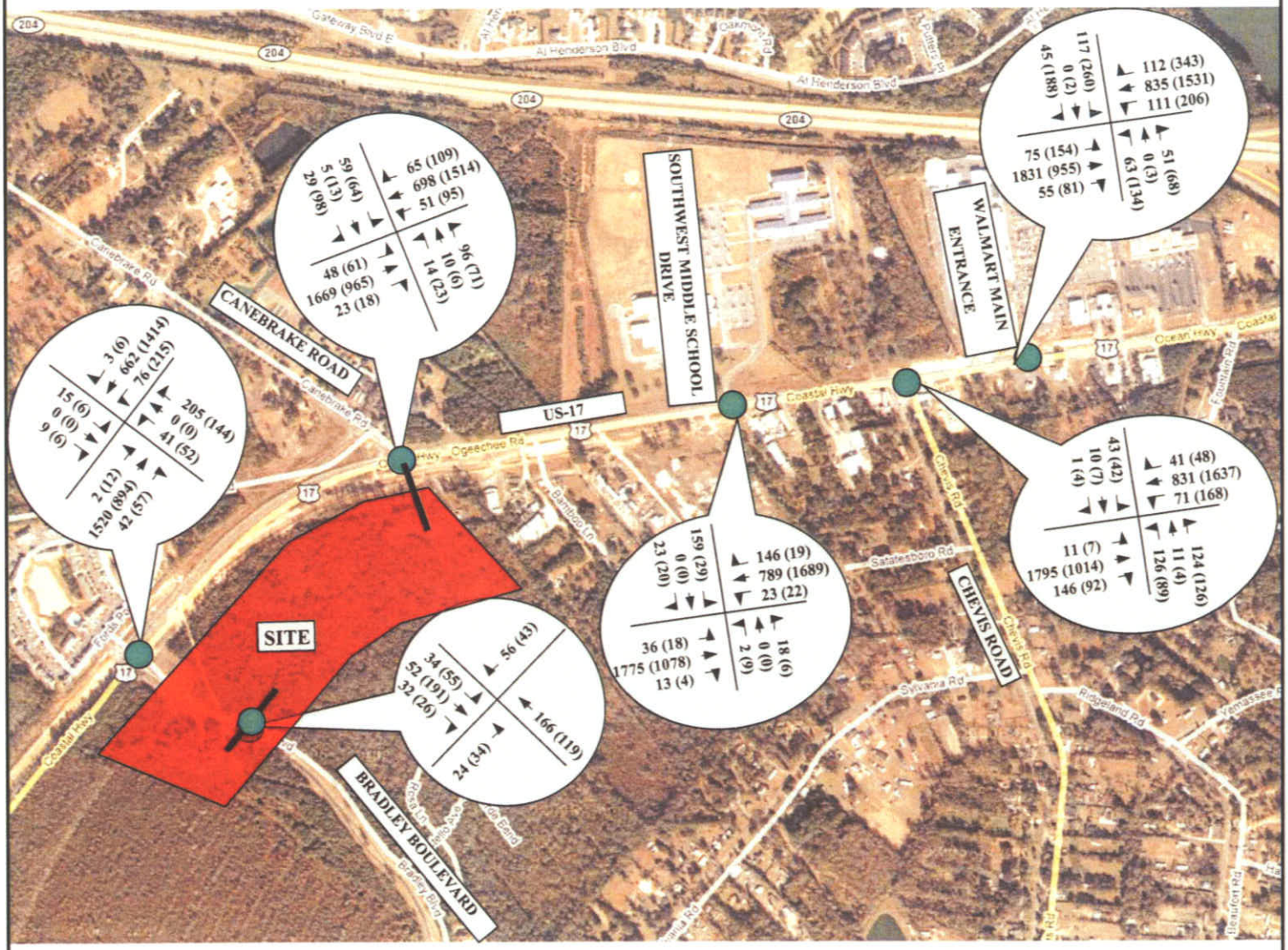


2019 SITE GENERATED (COMPLETE BUILD-OUT) TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Wilbur Smith Associates

Figure 6



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

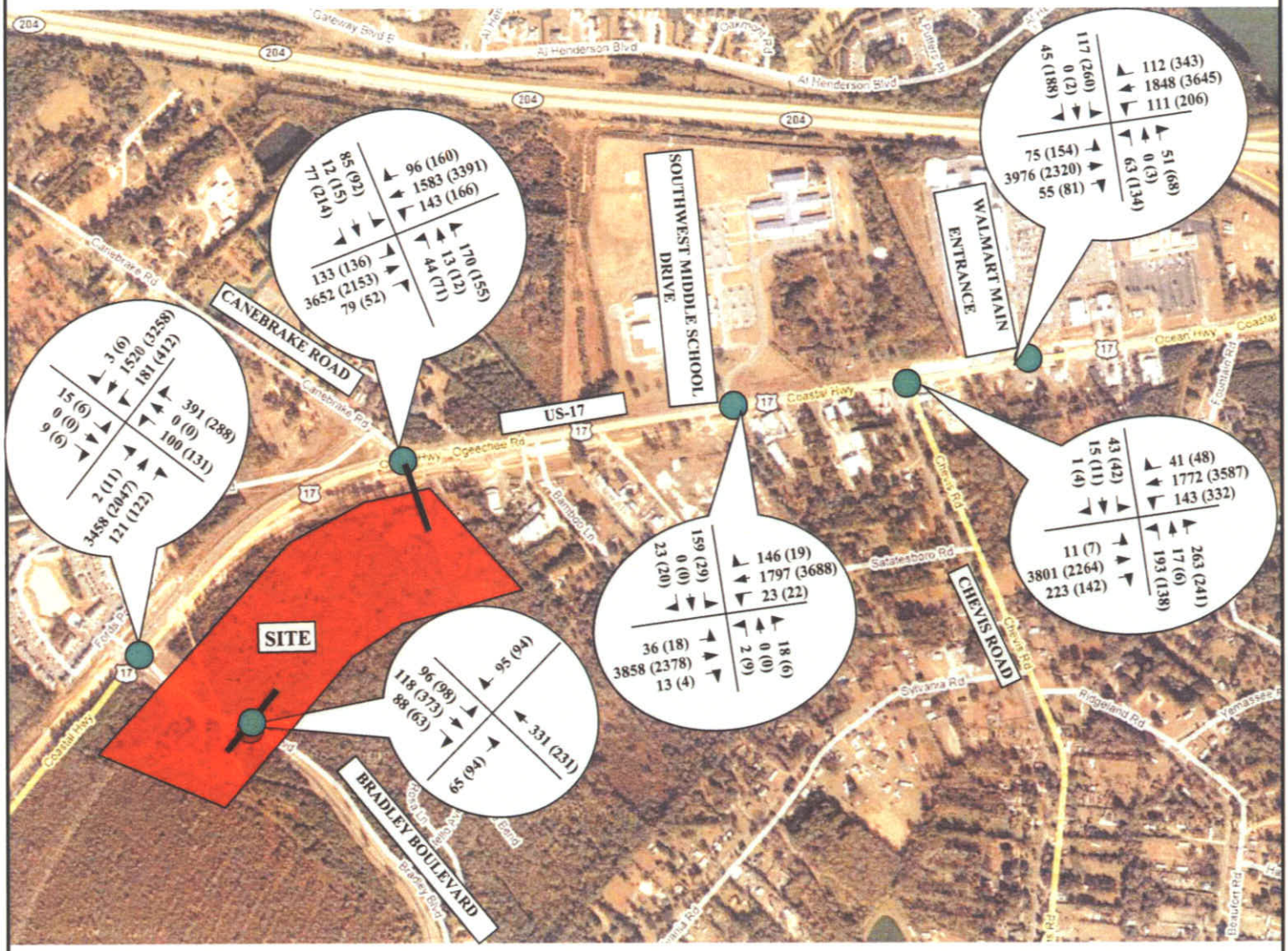
XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2009 FUTURE TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 7



Peak-Hours
7:00-8:00 AM
4:45-5:45 PM

Key

XX (XX) = AM (PM) Peak-Hour

Wilbur Smith Associates

2019 FUTURE TRAFFIC VOLUMES

Bradley Park: Savannah, GA

Figure 8

5.
Traffic Analyses

The critical intersections identified for this study were analyzed according to the methodologies published in the *2000 Highway Capacity Manual*. The analysis determines the "Level of Service (LOS)" of the intersections and is based on factors such as the number and types of lanes, signal timing, traffic volumes, pedestrian activity, etc. Levels of service are expressed in a range from "A" through "F," with "A" being the highest level of service, and "F" representing the lowest level of service. Tables 7 and 8 show the thresholds for Levels of Service "A" through "F" for unsignalized and signalized intersections, respectively.

Table 7
LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Delay/Vehicle (seconds)	Description
A	< 10.0	Little or no delay, very low main street traffic.
B	10.1 to 15.0	Short traffic delays, many acceptable gaps.
C	15.1 to 25.0	Average traffic delays, frequent gaps still occur.
D	25.1 to 35.0	Long traffic delays, limited number of acceptable gaps.
E	35.1 to 50.0	Very long traffic delays, very small number of acceptable gaps.
F	> 50.0	Extreme traffic delays, virtually no acceptable gaps in traffic.

Table 8
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

Level of Service	Delay/Vehicle (seconds)	Description
A	< 10.0	Most vehicles do not stop at all.
B	10.1 to 20.0	Some vehicles stop.
C	20.1 to 35.0	The number of vehicles stopping is significant, although many pass through without stopping.
D	35.1 to 55.0	Many vehicles stop. Individual cycle failures are noticeable.
E	55.1 to 80.0	Considered to be the limit of acceptable delay. Individual cycle failures are frequent.
F	> 80.0	Unacceptable delay.

Capacity analyses were conducted at each intersection for the following conditions:

- Existing 2007 conditions;
- Background 2009 conditions without development of the site;
- Future 2009 conditions with partial site built-out.
- Background 2019 conditions without development of the site;
- Future 2019 conditions with complete site built-out.

The traffic engineering software, Synchro/SimTraffic Version 7 was used to perform the capacity analyses. The capacity analyses worksheets are presented in Appendices B, C and D. The existing, 2009 background and 2009 future traffic conditions are summarized in Table 9, and discussed in the following paragraphs.

Existing 2007 Capacity Analyses

As shown in Table 7 below, under ***2007 Existing Conditions***, all study intersections are operating at overall acceptable levels of service during both the A.M. and P.M. peak hours except for the US-17/Southwest Middle School Drive intersection which operate at failing LOS "F" during the morning peak hour.

At ***US-17/Bradley Boulevard intersection***, the north approach on Fords Pointe Entrance is operating at LOS "F" during both peak hours. However, the traffic volume on Fords Pointe Entrance is low. The high delays experienced on Fords Pointe is primarily due to the high traffic volumes on US-17.

At ***US-17/Canebrake Road intersection***, the north approach on Canebrake Road is operating at LOS "F" during the P.M. peak hour. This is again primarily due to the high traffic volume on US-17.

At ***US-17/Southwest Middle School Drive intersection***, the north approach on the school drive is operating at LOS "F" during the both peak hours and the south approach is operating at LOS "E" during the P. M. peak hour.

At ***US-17/Chevis Road intersection***, all the approaches are operating at acceptable levels of service during both peak hours.

At ***US-17/Wal-Mart Main Entrance Drive intersection***, all the approaches are operating at acceptable levels of service during both peak hours. However, the left-turn movement on the north Wal-Mart drive approach is operating at LOS "E" during both the A.M. and P.M. peak hours.

Table 9

EXISTING, BACKGROUND, AND FUTURE CAPACITY ANALYSES – PHASE I BUILD-OUT (2009)

	EXISTING CONDITIONS (2007)		BACKGROUND CONDITIONS (2009)		FUTURE CONDITIONS (2009)	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
Approach	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS
US-17 and Bradley Boulevard (Unsignalized)						
Overall	**3.0/A**	**2.7/A**	**13.3/B**	**7.4/A**	**>200.0/F**	**>200.0/F**
West	0.0/A	0.2/A	0.0/A	0.2/A	0.0/A	0.2/A
East	0.6/A	0.8/A	1.1/A	1.2/A	2.1/A	1.7/A
South	30.7/C	32.0/D	80.2/F	78.1/F	>200.0/A	>200.0/F
North	73.4/F	106.7/F	>200.0/F	>200.0/F	>200.0/F	>200.0/F
US-17 and Canebrake Road/Site Drive 1 (Unsignalized)						
Overall	**3.4/A**	**6.6/A**	**17.5/B**	**56.3/F**	**>200.0/F**	**>200.0/F**
West	0.2/A	0.7/A	0.3/A	0.9/A	0.3/A	0.9/A
East	0.0/A	0.0/A	0.0/A	0.0/A	1.0/A	0.7/A
North	67.4/F	100.1/F	>200.0/F	>200.0/F	>200.0/F	>200.0/F
South			**N/A**		>200.0/F	>200.0/F
US-17 and Southwest Middle School Drive (Unsignalized)						
Overall	**>200.0/F**	**6.1/A**	**>200.0/F**	**15.3/C**	**>200.0/F**	**28.5/D**
West	0.2/A	0.2/A	0.2/A	0.2/A	0.2/A	0.2/A
East	0.4/A	0.2/A	0.4/A	0.1/A	0.4/A	0.1/A
South	27.1/D	38.2/E	43.5/E	58.6/F	58.0/F	95.1/F
North	>200.0/F	164.5/F	>200.0/F	>200.0/F	>200.0/F	>200.0/F
US-17 and Chevis Road (Signalized)						
Overall	**17.7/B**	**14.1/B**	**24.9/C**	**17.9/B**	**32.0/C**	**18.3/B**
West	18.9/B	13.9/B	31.3/C	18.7/B	43.1/D	18.6/B
East	8.6/A	11.3/B	11.0/B	16.5/B	11.3/B	16.8/B
South	32.0/C	27.1/C	26.4/C	21.2/C	26.6/C	24.2/C
North	43.6/D	43.1/D	35.0/D	33.7/C	35.0/D	38.3/D

Table 9 (Cont'd)

EXISTING, BACKGROUND, AND FUTURE CAPACITY ANALYSES – PHASE I BUILD-OUT (2009)

Approach	EXISTING CONDITIONS (2007)		BACKGROUND CONDITIONS (2009)		FUTURE CONDITIONS (2009)	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
	Delay/LOS	Delay/LOS	Delay/LOS	Approach	Delay/LOS	Delay/LOS
US-17 and Wal-Mart Drive (Signalized)						
Overall	**20.0/C**	**34.1/C**	**35.9/D**	**38.7/D**	**39.2/D**	**42.2/D**
West	19.8/B	24.6/C	45.7/D	29.7/C	48.8/D	38.9/C
East	15.2/B	36.1/D	18.1/B	41.1/D	22.0/C	42.4/D
South	0.0/A	33.8/C	28.6/C	35.1/D	32.4/C	34.5/C
North	43.8/D	47.2/D	52.3/D	53.0/D	54.8/D	54.5/D
Bradley Boulevard and Site Drive 2 (Unsignalized)						
Overall					**3.0/A**	**2.7/A**
North (Bradley Blvd)					2.2/A	1.5/A
South (Bradley Blvd)			**N/A**		0.0/A	0.0/A
West (Site Drive)					12.1/B	13.9/B
East (Site Drive)					9.5/A	9.1/A

Note: US-17 was considered to be a east-west roadway near the site for ease of analyses.

Background 2009 Capacity Analyses

Under ***2009 Background Conditions***, without the addition of site traffic, all study intersection would experience higher delays as compared to existing conditions due to the inherent growth in traffic and also due to the addition of traffic from approved background developments.

Based on these higher traffic volumes on US-17, an eastbound right-turn lane on US-17 would be required at the ***US-17/Bradley Boulevard intersection***. With this improvement, the intersection would operate at overall acceptable levels of service. However, both the north and the south approaches would operate at LOS "F" during both peak hours. However, the traffic volumes on Fords Pointe Entrance and Bradley Boulevard would not be high enough to warrant a traffic signal under background traffic conditions.

The ***US-17/Canebrake Road intersection*** would operate at overall failing LOS "F" during the P.M. peak hour. However, the traffic volumes on Canebrake would not warrant a traffic signal.

The ***US-17/Southwest Middle School Drive intersection*** would operate at similar failing levels of service as under existing conditions. In addition, the south approach would now operate at LOS "E" or worse during both peak hours. The School Drive would meet one of the eight traffic signal warrants contained in the Manual on Uniform traffic Devices (MUTCD) – the Peak Hour Warrant (Warrant 3) during the A.M. peak hour. However, based on the low traffic volumes on the School Drive during other times of the day, it is unlikely that any of the other warrants would be met.

The ***US-17/Chevis Road intersection*** would continue to operate at acceptable levels of service during both peak hours.

The ***US-17/Wal-Mart Main Entrance Drive intersection*** would continue to operate at overall acceptable levels of service. However, the left-turn movement on the north Wal-Mart drive approach would operate at LOS "E" during the A.M. peak hour and at LOS "F" during the P.M. peak hour.

Future 2009 Capacity Analyses

Under ***2009 Future Conditions***, with the addition of the site traffic, the ***US-17/Bradley Boulevard intersection*** would operate at LOS "F" during both peak hours. This is because of the higher delays experienced by the left-turn movement on Bradley Boulevard. However, the left-turn traffic volumes on Bradley Boulevard would still not be high enough to warrant a traffic signal.

The ***US-17/Canebrake Road/Site Drive intersection*** would operate at overall LOS "F" during both peak hours. However, the left-turn traffic volumes on Canebrake and the Site Drive would not be high enough to warrant a traffic signal.

The ***US-17/Southwest Middle School Drive intersection*** would operate at similar failing levels of service as under background conditions. Both the north and the south approaches would operate at LOS "E" or worse during both peak hours. As under background conditions, it is unlikely that any traffic signal warrants other than the peak hour warrant would be met at this location.

The ***US-17/Chevis Road intersection*** would continue to operate at acceptable levels of service during both peak hours.

The ***US-17/Wal-Mart Main Entrance Drive intersection*** would continue to operate at overall acceptable levels of service similar to background conditions. The left-turn movement on the north Wal-Mart drive approach would continue to operate at LOS "E" during the A.M. and at LOS "F" during the P.M. peak hour.

The ***Bradley Boulevard/Site Drive intersection*** would operate at acceptable levels of service during both peak hours.

Background 2019 Capacity Analyses

Under ***2019 Background Traffic Conditions***, significant roadway improvements would be necessary to accommodate the traffic generated by the background developments and also to accommodate the inherent traffic growth in the study area. The following roadway improvements were identified and assumed for this study:

- One additional lane on US-17 in each direction between Bradley Boulevard and Southwest Middle School Drive; two additional lanes on US-17 in each direction east of Southwest Middle School Drive resulting in four lanes on US-17 in each direction.
- Signalization of US-17/Bradley Boulevard, US-17/Canebrake Road and US-17/Southwest Middle School Drive intersections.
- Dual right-turn lanes on northbound Bradley Boulevard at US-17 intersection and protected/overlap phase for the right-turn movement.
- Separate left-turn lane and shared through/right-turn lanes for the southbound Fords Pointe Entrance, Southwest Middle School Drive, and northbound Salt Grass Drive at Walmart.

The above recommended roadway improvements were considered as part of the 2019 background analysis.

The ***US-17/Bradley Boulevard intersection*** would operate at overall acceptable levels of service. However, the Fords Pointe approach would operate at LOS "E" during the morning peak hour.

Table 10

EXISTING, BACKGROUND, AND FUTURE CAPACITY ANALYSES – COMPLETE BUILD-OUT (2019)

	EXISTING CONDITIONS (2007)		BACKGROUND CONDITIONS (2019)		FUTURE CONDITIONS (2019)	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
Approach	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS	Delay/LOS
US-17 and Bradley Boulevard						
Overall	**3.0/A**	**2.7/A**	**44.1/D**	**16.7/B**	**48.0/D**	**22.5/C**
West	0.0/A	0.2/A	54.2/D	31.8/C	49.2/D	31.0/C
East	0.6/A	0.8/A	12.7/B	24.3/C	19.2/B	28.7/C
South	30.7/C	32.0/D	37.3/D	17.0/B	53.8/D	30.8/C
North	73.4/F	106.7/F	71.5/E	15.7/B	125.4/F	20.2/C
US-17 and Canebrake Road/Site Drive 1						
Overall	**3.4/A**	**6.6/A**	**33.1/C**	**36.3/C**	**42.0/D**	**37.6/D**
West	0.2/A	0.7/A	43.7/D	16.9/B	52.4/D	19.7/B
East	0.0/A	0.0/A	8.8/A	48.9/D	18.4/B	48.7/D
North	67.4/F	100.1/F	31.6/C	20.9/C	55.5/E	29.0/C
South/Site Drive	**N/A**		56.2/E	50.0/D	59.9/E	50.8/D
US-17 and Southwest Middle School Drive						
Overall	**>200.0/F**	**6.1/A**	**33.9/C**	**7.6/A**	**37.7/D**	**8.2/A**
West	0.2/A	0.2/A	43.0/D	3.6/A	49.5/D	3.8/A
East	0.4/A	0.2/A	5.3/A	9.4/A	6.1/A	10.3/B
South	27.1/D	38.2/E	41.8/D	30.1/C	48.1/D	31.4/C
North	>200.0/F	164.5/F	112.5/F	42.6/D	113.4/F	42.6/D
US-17 and Chevis Road						
Overall	**17.7/B**	**14.1/B**	**40.8/D**	**27.0/C**	**44.0/D**	**27.8/C**
West	18.9/B	13.9/B	50.0/D	30.7/C	54.6/D	36.7/C
East	8.6/A	11.3/B	16.0/B	25.5/C	18.1/B	22.8/C
South	32.0/C	27.1/C	60.6/E	20.7/C	63.7/E	24.1/C
North	43.6/D	43.1/D	47.1/D	33.1/C	46.9/D	37.6/D

Table 10 (Cont'd)

EXISTING, BACKGROUND, AND FUTURE CAPACITY ANALYSES – COMPLETE BUILD-OUT (2019)

Approach	EXISTING CONDITIONS (2007)		BACKGROUND CONDITIONS (2019)		FUTURE CONDITIONS (2019)	
	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak	A.M. Peak	P.M. Peak
	Delay/LOS	Delay/LOS	Delay/LOS	Approach	Delay/LOS	Delay/LOS
US-17 and Wal-Mart Drive						
Overall	**20.0/C**	**34.1/C**	**64.3/E**	**63.0/E**	**65.9/E**	**67.5/E**
West	19.8/B	24.6/C	87.9/F	43.1/D	90.9/F	44.3/D
East	15.2/B	36.1/D	18.8/B	71.9/E	20.2/C	79.7/E
South	0.0/A	33.8/C	50.8/D	51.8/D	52.8/D	51.8/D
North	43.8/D	47.2/D	109.2/F	100.8/F	109.9/F	100.8/F
Bradley Boulevard and Site Drive 2 (Unsignalized)						
Overall			**2.7/A**	**2.7/A**	**4.5/A**	**6.2/A**
North (Bradley Blvd)			1.7/A	1.1/A	2.6/A	1.5/A
South (Bradley Blvd)	**N/A**		0.0/A	0.0/A	0.0/A	0.0/A
West (Site Drive)			15.5/C	18.7/C	26.1/D	44.3/E
East (Site Drive)			10.6/B	9.7/A	11.2/B	10.3/B

Note: US-17 was considered to be a east-west roadway near the site for ease of analyses.

The ***US-17/Canebrake Road intersection*** would operate at overall acceptable levels of service during both peak hours.

The ***US-17/Southwest Middle School Drive intersection*** would operate at overall acceptable levels of service during both peak hours. However, the north approach would operate at LOS "F" during the A.M. peak hour. It should be noted, if a signal at this driveway is deemed as too close to the Chevis Road signal and not approved, it would be expected that much of the school traffic would use the Chevis Road signal to exit the school to go east.

The ***US-17/Chevis Road intersection*** would operate at overall acceptable levels of service during both peak hours. However, the south approach would operate at LOS "E" during the A.M. peak hour.

The ***US-17/Wal-Mart Main Entrance Drive intersection*** would operate at overall LOS "E" during both peak hours. The high volume on US-17 is the primary reason of higher delays experienced at this intersection. The addition of a fifth through lane on US-17 would reduce the delays; however, it is highly unlikely another lane on US-17 in each direction would be feasible.

Future 2019 Capacity Analyses

Under ***2019 Future Traffic Conditions***, all the improvements assumed under 2019 background conditions were considered. The following traffic operations were observed:

The ***US-17/Bradley Boulevard intersection*** would operate at overall acceptable levels of service. However, the north approach would operate at LOS "F" during the morning peak hour. Due to minimal volume on the north approach (only about 15 left-turn vehicles during the A.M. peak hour) no mitigation is recommended.

The ***US-17/Canebrake Road intersection*** would operate at overall acceptable levels of service during both peak hours. However, the Canebrake Road approach and the site drive approach would operate at the threshold of LOS "E" during the A.M. peak hour.

The ***US-17/Southwest Middle School Drive intersection*** would operate at overall acceptable levels of service during both peak hours. The north approach would operate at similar levels of service as that determined for the background conditions.

The ***US-17/Chevis Road intersection*** would operate at overall acceptable levels of service during both peak hours. The south approach would continue to operate at LOS "E" during the A.M. peak hour.

The ***US-17/Wal-Mart Main Entrance Drive intersection*** would continue to operate at overall LOS "E" during both peak hours. As noted in background conditions, the high volume on US-17 is the primary reason for these higher delays.

The ***Bradley Boulevard/Site Drive intersection*** would operate at overall acceptable levels of service during both peak hours. However, the west site drive approach would operate at LOS "E"

during the P.M. peak hour. Since, stacking would occur on-site without causing any disruption of traffic on Bradley Boulevard, no mitigation is recommended.

Site Access

The site is proposed to be served by one access drive on US-17 and one access drive on Bradley Boulevard. The site drive on US-17 is proposed to be aligned with Canebrake Road forming the fourth leg of the US-17/Canebrake Road intersection.

The site drive on Bradley Boulevard is proposed to be a four-legged intersection with stop control on the site drive approaches.

Auxiliary Lane Analysis

To determine whether left and right turn auxiliary lanes would be warranted at the site drive on US-17, the *"Georgia Regulations for Driveway and Encroachment Control"* was consulted.

Site Drive on US-17 at Canebrake

Based on a daily traffic volume on US-17 that exceeds the Georgia criteria of 10,000 vehicles, a left-turn lane on westbound US-17 and a right-turn lane on eastbound US-17 would be needed at the US-17/Site Drive at Canebrake Road. There is an existing U-turn lane on westbound US-17 at Canebrake Road that currently serves the U-turn vehicles at the intersection. This lane can be restriped to operate as a left-turn lane which would serve the site drive.

Two outbound lanes on the site drive is recommended; one shared left-turn/through lane and the one dedicated right-turn lane. One inbound lane on the site drive will adequately serve the site.

Site Drive on Bradley Boulevard

Based on a peak left-turn volume of 98 on the southbound approach of Bradley Boulevard and a review of typical left turn lane guidelines, a left-turn lane is recommended on Bradley Boulevard at the site drive.

Based on a peak right-turn volume of 88 and a review of typical left turn lane guidelines, a right-turn lane on southbound Bradley Boulevard would be required.

One inbound and one outbound lane on each of the site drive approaches will adequately accommodate the traffic.

6.
Conclusions and Recommendations

This traffic analysis evaluated the impact of the Bradley Park development site traffic on the area roadways and determined the roadway improvements necessary to accommodate the site traffic. The analysis resulted in the following conclusions:

- The site will generate 848 new A.M. peak hour trips, 863 new P.M. peak hour trips, and 6,710 new daily trips.
- *Under 2007 existing traffic conditions*, all the study intersections are operating at overall acceptable levels of service. High delays are experienced at the unsignalized intersections due to the high volumes on US-17.
- *Under 2009 background traffic conditions (without the addition of site traffic)*, the following roadway improvement is recommended:
    - Construct a separate right-turn lane on eastbound US-17 at Bradley Boulevard.

  Higher delays will be experienced at the unsignalized intersections, i.e. at Fords Pointe Entrance, Canebrake Road and Southwest School Drive. However, due to the low left-turn volumes on these minor streets during the course of the day, none of them would meet traffic signal warrants.

- *Under 2009 future traffic conditions (with the addition of site traffic)*, higher delays will be experienced at the unsignalized intersections. However, similar to background conditions, none of them would meet traffic signal warrants.
- *Under 2019 background traffic conditions (without the addition of site traffic)*, significant roadway improvements would be required to accommodate the traffic generated by the background developments and the inherent growth in traffic in the study area. The improvements are listed below:
    - One additional lane on US-17 in each direction between Bradley Boulevard and Southwest Middle School Drive; two additional lanes on US-17 in each direction east of Southwest Middle School Drive resulting in four lanes on US-17 in each direction.
    - Signalization of US-17/Bradley Boulevard, US-17/Canebrake Road and US-17/Southwest Middle School Drive intersections.

- Dual right-turn lanes on northbound Bradley Boulevard at US-17 intersection and protected/overlap phase for the right-turn movement.
- Separate left-turn lane and shared through/right-turn lanes for southbound Fords Pointe Entrance, Southwest Middle School Drive, and northbound Salt Grass Drive at Walmart.

With these improvements in place, all study intersections except the US-17/Walmart Drive intersection would operate at overall acceptable levels of service. Adding a fifth lane on US-17 in each direction would reduce the delays; however, it is unlikely that this would be feasible.

- *Under 2019 future traffic conditions (with the addition of site traffic)*, the following roadway improvements are recommended:

  - Construct a right-turn lane on eastbound US-17 at the Site Drive.
  - Restripe existing westbound U-turn lane on US-17 at the Site Drive to provide a dedicated westbound left turn lane on US-17.
  - Construct a left-turn lane on southbound Bradley Boulevard at the Site Drive.
  - Construct a right-turn lane on southbound Bradley Boulevard at the Site Drive.

Based on the results of this analysis and the roadway improvements recommended above, the area roadways will be able to adequately accommodate the Bradley Park development site traffic.