REVISED
TRAFFIC IMPACT STUDY

CHESAPEAKE GROVE
(RODGERS PROPERTY)
Residential Development
City of Annapolis, Maryland

Revised
October, 2017

Prepared For:
City of Annapolis

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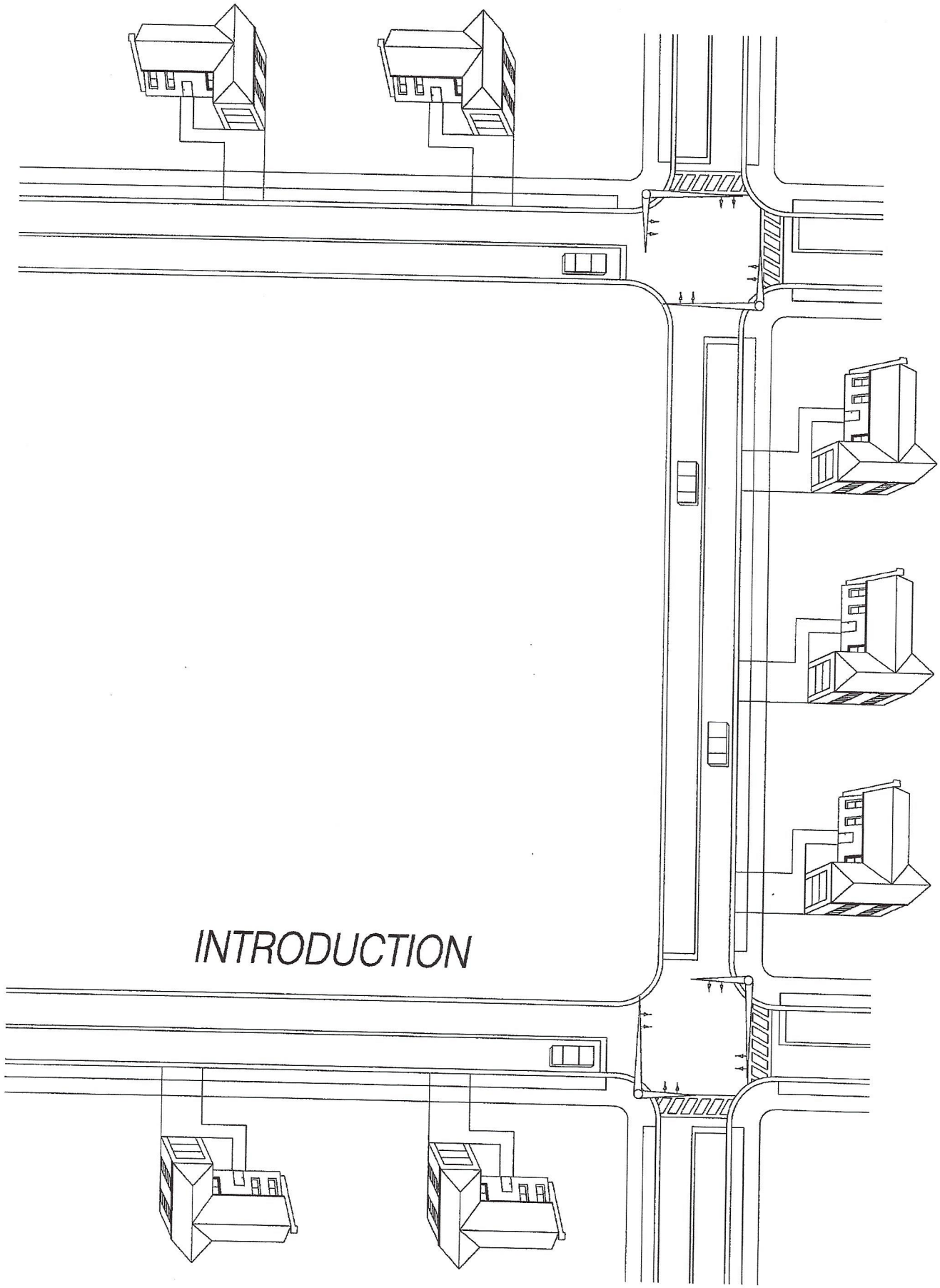


INTRODUCTION

INTRODUCTION

Traffic Concepts, Inc. has been requested by the City of Annapolis to revise the traffic impact study previously prepared for the proposed Rodgers Property (now known as Chesapeake Grove) dated August, 2017. The City provided traffic study comments on September 21, 2017 that are addressed with this revised study. The Chesapeake Grove project is located along the east side of Bembe Beach Road. (See Exhibit 1 for site location). The development will create 45 residential townhomes, with access directly to Bembe Beach Road.

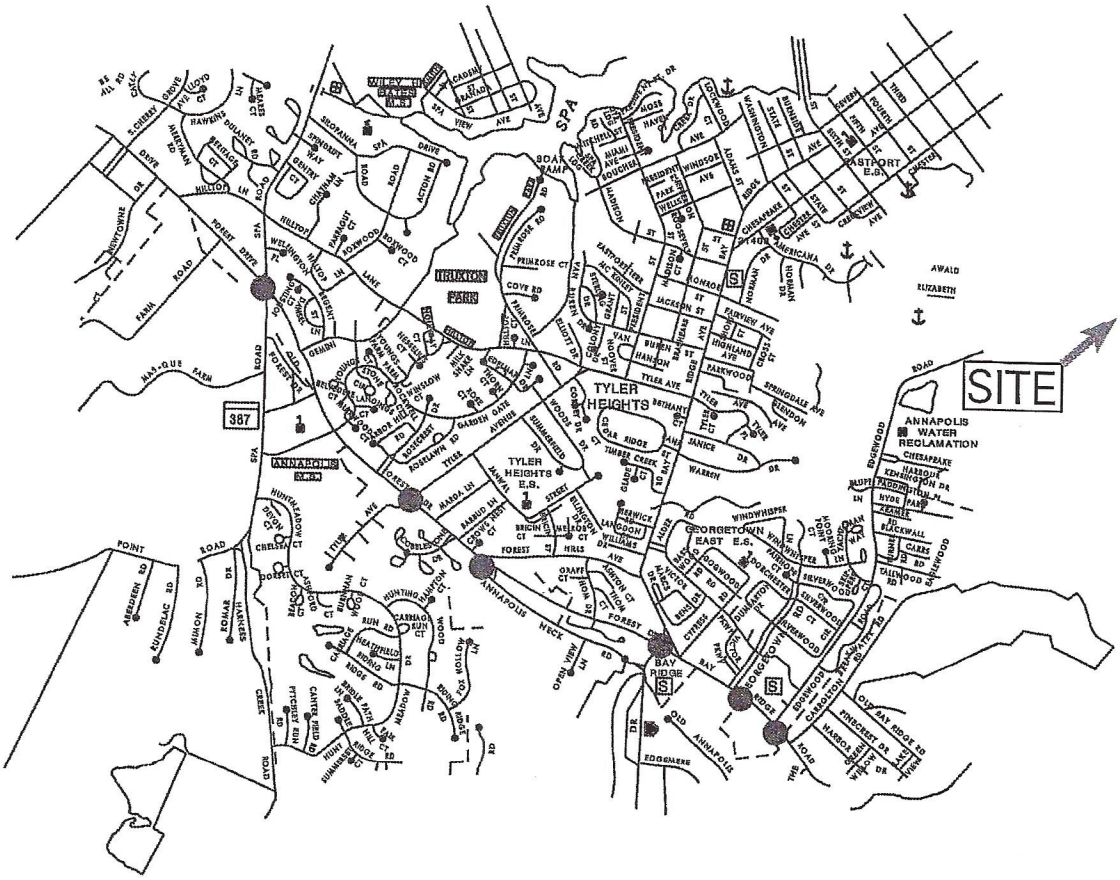
A scope of study was provided by the City of Annapolis, which established such parameters as key intersections, method of analysis, study time periods, etc. Based on the comments received from the City of Annapolis dated May 17, 2017, the scope of study was expanded to include two additional key intersections (Forest Drive @ Annapolis Neck Road and Forest Drive @ Tyler Avenue).

Exhibit 1 shows the locations of the key intersections studied. The following intersections will be analyzed during the weekday AM, weekday PM, and Saturday noontime peak periods:

Key Intersections

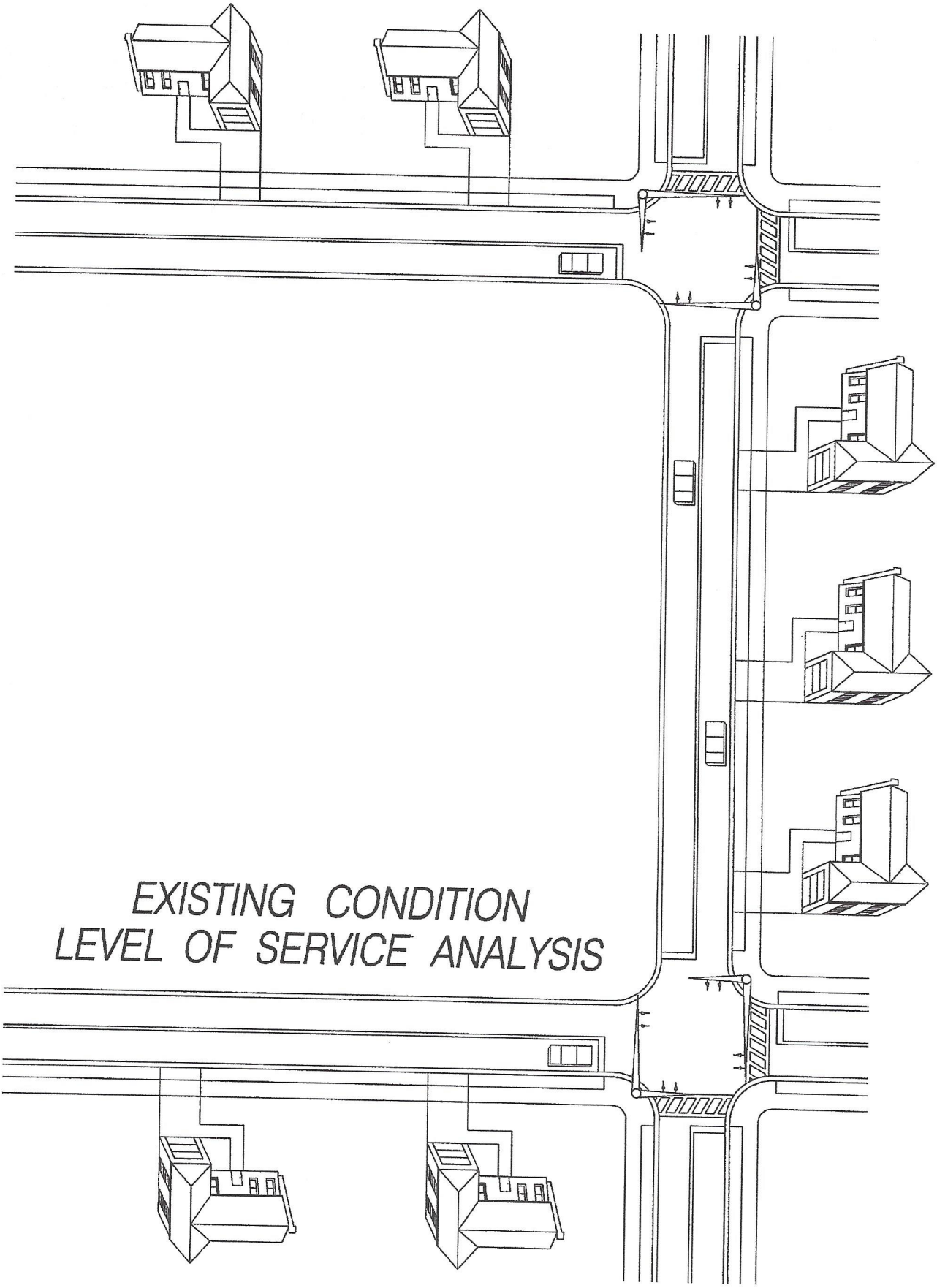
- Forest Drive @ Spa Road
- Forest Drive @ Tyler Avenue
- Forest Drive @ Annapolis Neck Road
- Forest Drive @ Bay Ridge Avenue/Hillsmere Drive
- Bay Ridge Road @ Georgetown Road
- Bay Ridge Road @ Edgewood Road

The traffic study will analyze the key intersections under existing, background and future conditions using the SYNCHRO program. The SimTraffic program will also be used to conduct a queuing analysis under background and future traffic conditions.



● – Intersection Studied

TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 1 Site Location



EXISTING CONDITION
LEVEL OF SERVICE ANALYSIS

EXISTING CONDITION – LEVEL OF SERVICE ANALYSIS

The lane configurations at the key intersections are shown on Exhibit 2. Detailed intersection configuration sketches can be found in Appendix II of this report.

The key intersections were counted during a typical weekday AM, weekday PM, and Saturday noontime. Using these counts, the highest one hour time period of traffic flow was determined for each time period. Details of the traffic count data can be found in Appendix I of this report.

Exhibit 3 has been prepared to show the peak hour turning movement volumes as discussed above at each key studied intersection. The SYNCHRO program was used to determine capacity levels at intersections as directed by the City of Annapolis. The SYNCHRO analysis uses the Transportation Research Board's Highway Capacity Manual analysis methodology for capacity calculations. Factors include a wide range of parameters such as signal cycle lengths and phasing split timing, signal coordination offsets, lane use, etc. Results include the level of service designation for the overall intersection as well as individual movements at each intersection based on average delay estimates.

Base traffic signal and intersection design parameters were supplied by Anne Arundel County or gathered during our field investigation. As mentioned the SYNCHRO analysis program will be used to evaluate the capacity and flow conditions under existing, background and future traffic scenarios.

The SYNCHRO program will calculate intersection delays and assign a level of service based on that delay calculated from A to F. SYNCHRO is a macroscopic analysis that is based on the signalized intersection capacity analysis found in the Highway Capacity Manual. Equations are used to determine delay and queue length.

Using the existing traffic volumes, each intersection has been analyzed utilizing the SYNCHRO program with the following results. Details of the calculations can be found in Appendices III-A through III-C.

EXISTING CONDITION - SYNCHRO RESULTS

	AM Delay(LOS)	PM Delay(LOS)	SAT Delay(LOS)
Forest Drive @ Spa Road			
Eastbound	19.5 (B)	38.2 (D)	21.8 (C)
Westbound	21.3 (C)	9.8 (A)	5.8 (A)
Northbound	92.7(F)	79.9 (E)	60.1 (E)
Southbound	74.1 (E)	80.7 (F)	57.9 (E)
Overall Intersection	**31.8 (C)**	**34.9 (C)**	**19.8 (B)**
Forest Drive @ Tyler Avenue			
Eastbound	5.8 (A)	6.4 (A)	5.0 (A)
Westbound	13.6 (B)	5.7 (A)	7.1 (A)
Northbound	61.1 (E)	70.2 (E)	45.8 (D)
Southbound	55.8 (E)	38.1 (D)	33.5 (C)
Overall Intersection	**13.6 (B)**	**9.5 (A)**	**7.6 (A)**
Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive			
Eastbound	7.6 (A)	12.1 (B)	16.9 (B)
Westbound	31.1 (C)	28.2 (C)	20.7 (C)
Northbound	61.9 (E)	65.9 (E)	53.9 (D)
Southbound	67.9 (E)	66.0 (E)	55.6 (E)
Overall Intersection	**33.9 (C)**	**32.9 (C)**	**30.2 (C)**
Bay Ridge Road @ Georgetown Road			
Eastbound	6.2 (A)	6.0 (A)	2.0 (A)
Westbound	3.7 (A)	5.6 (A)	5.1 (A)
Southbound	40.3 (D)	22.1 (C)	34.8 (C)
Overall Intersection	**8.9 (A)**	**7.7 (A)**	**7.8 (A)**
Bay Ridge Road @ Edgewood Road			
Eastbound	9.7 (A)	6.3 (A)	3.7 (A)
Westbound	14.2 (B)	21.2 (C)	16.5 (B)
Northbound	44.2 (D)	55.3 (E)	51.0 (D)
Southbound	20.8 (C)	27.2 (C)	19.2 (B)
Overall Intersection	**14.0 (B)**	**15.5 (B)**	**12.6 (B)**

The City of Annapolis traffic impact study guidelines require that the overall intersection operate at an acceptable "D" or better level of service to determine adequacy. The above chart shows the delay and level of service for each approach at the study intersections as well as the overall intersection delay/level of service. As noted, several of the side road approaches operate at "E" and "F" levels of service. This is to be expected for side road approaches along a corridor such as Forest Drive/Bay Ridge Road. When signal cycle lengths reach 120 seconds and the majority of the cycle time is given to the mainline (in order to achieve progression), the side road approaches are given a small portion of the cycle length. Therefore, the side road approaches are forced to wait the majority of the cycle length, typically longer than the 55 seconds that will generate an "E" level of service.

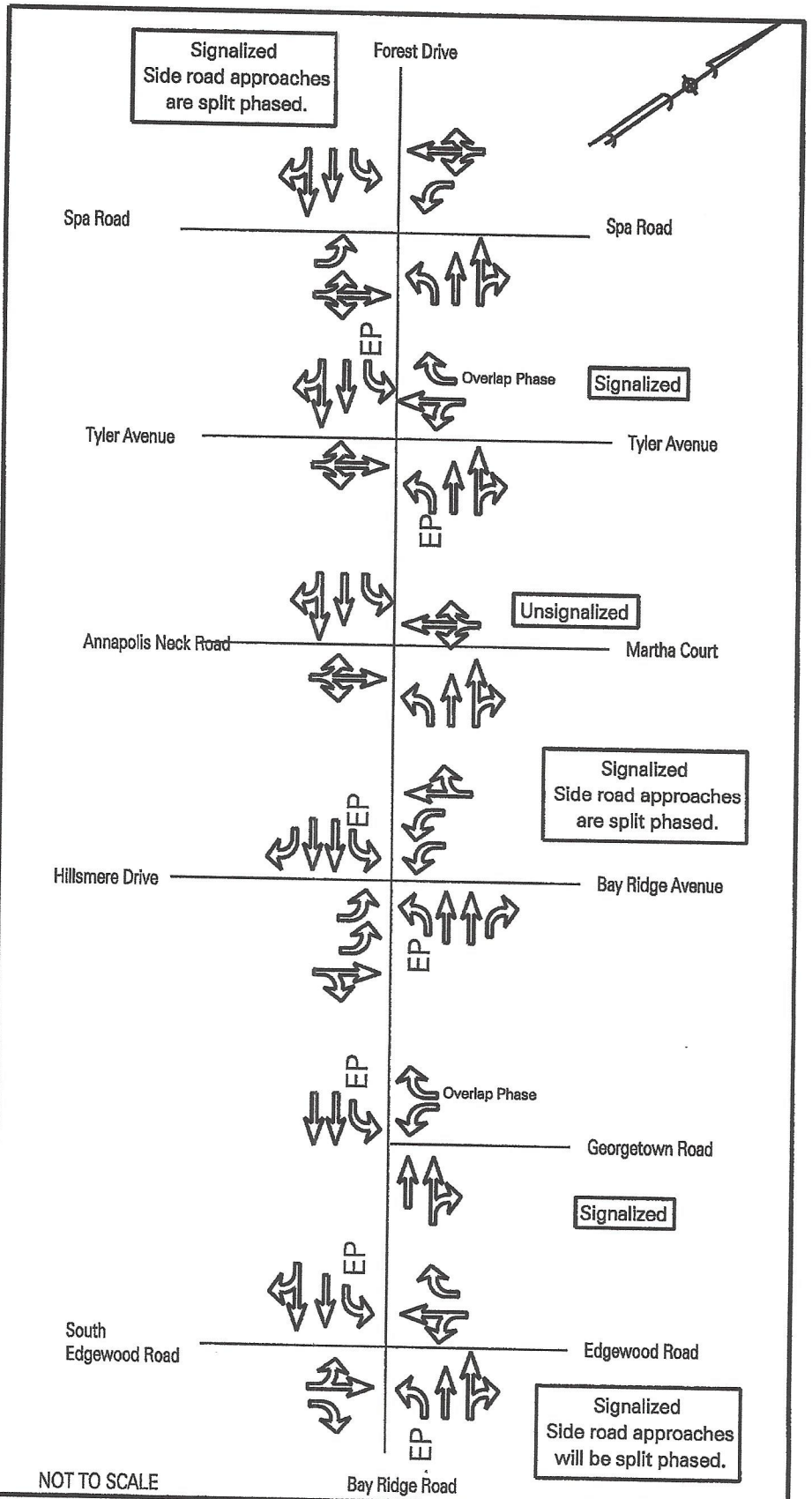


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EXHIBIT 2
Lane Configurations

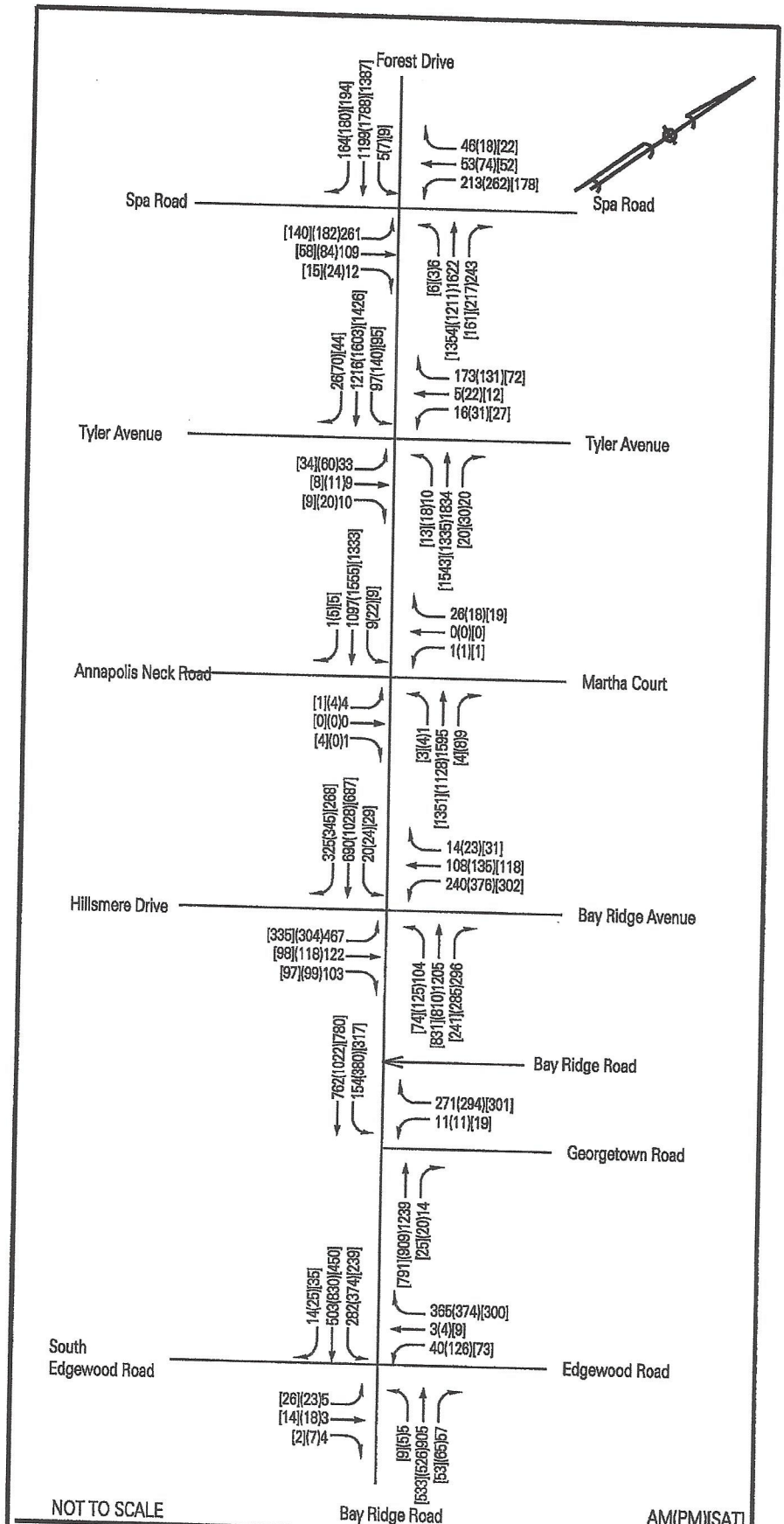

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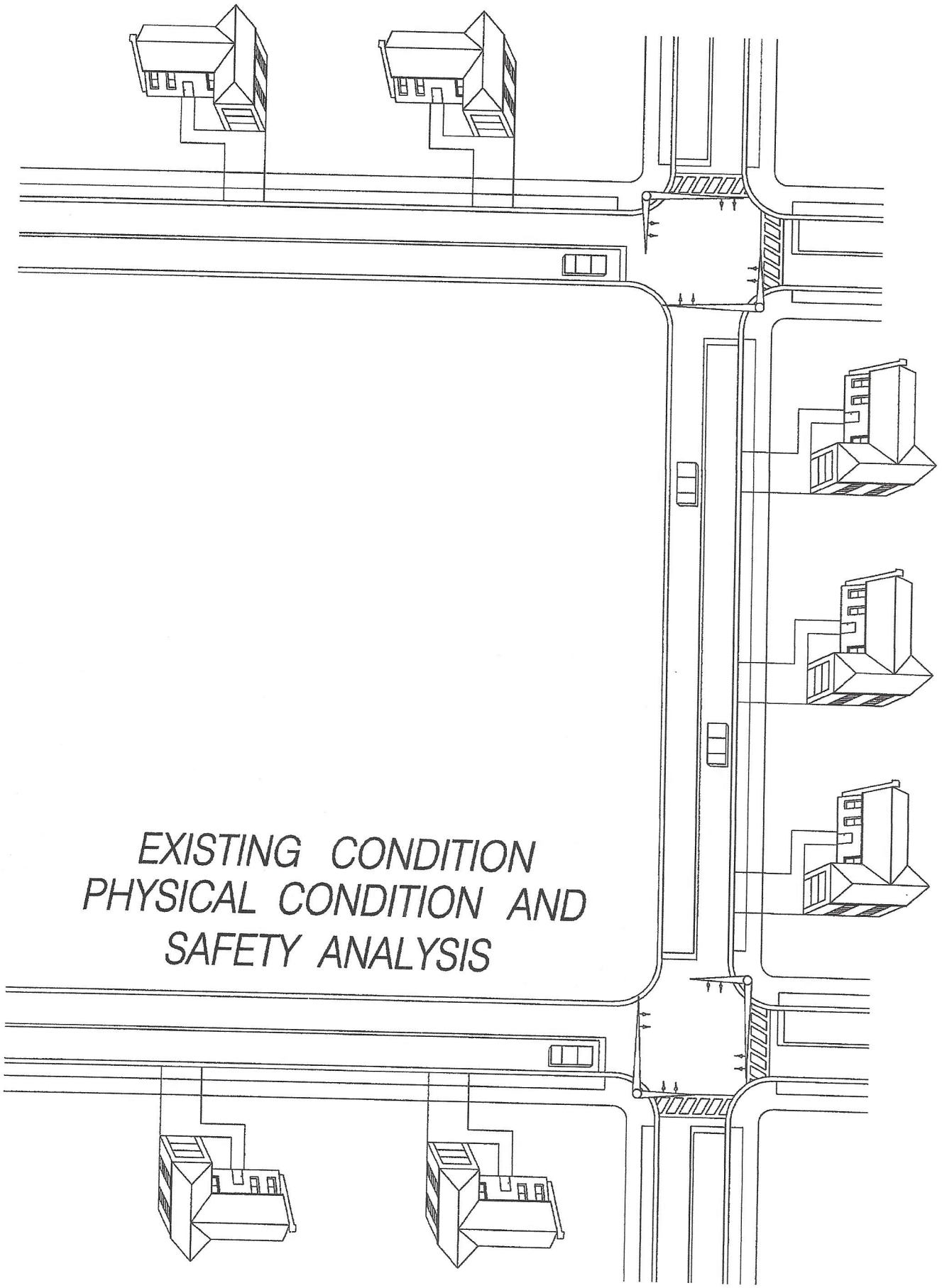
EXHIBIT 3
Existing Traffic Volumes



EXISTING CONDITION PHYSICAL CONDITION AND SAFETY ANALYSIS

EXISTING CONDITION – PHYSICAL CONDITION AND SAFETY ANALYSIS

Bay Ridge Road – from Edgewood Road to Hillsmere Drive is a fully developed corridor of approximately 2,000 feet in length. There are three (3) traffic signals in this corridor, all studied as part of this analysis. There are numerous unsignalized accesses and a road that serves generally individual or minor commercial businesses. The traffic signals are maintained by Anne Arundel County and operate in a coordinated system during peak travel times. It is estimated that this portion of Bay Ridge Road handles approximately 27,230 vehicles per day and functions as an arterial roadway.

The road section is 5-lanes wide marked with two eastbound and two westbound lanes, with a center lane marked as either a two-way left turn lane or exclusive left turn lane. Posted speed is 40 MPH and during peak travel times, vehicle speeds were observed at or below the posted speed. The coordinated signal system can be monitored by Anne Arundel County from a remote location providing real-time ability to adjust signal system operation during incident periods. The County has also received grants from the Federal Highway Administration and has implemented an advanced signal monitoring system along the full Forest Drive/Bay Ridge Road corridor.

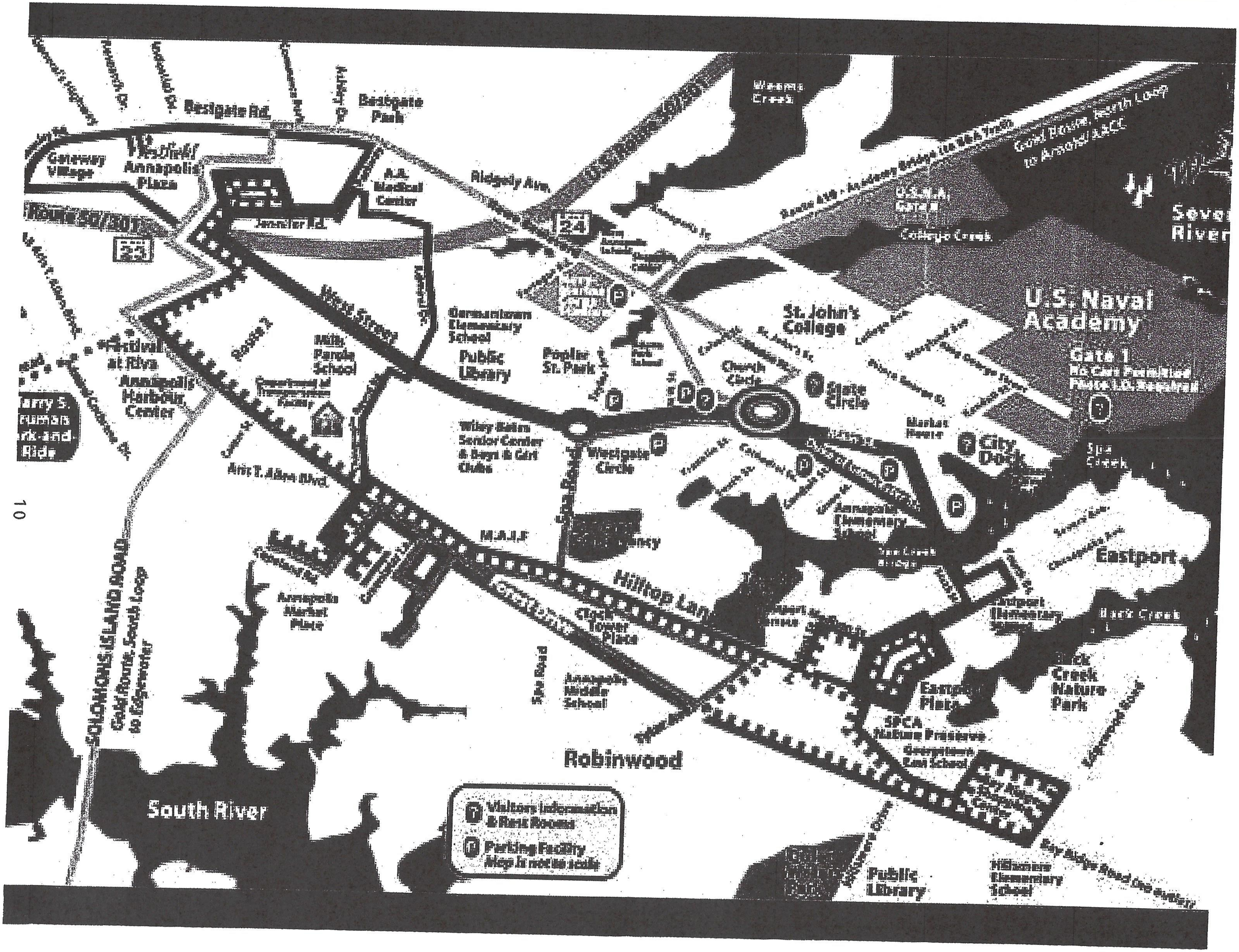
Sidewalks exist along each side of Bay Ridge Road. Pedestrian crosswalks and traffic signal indications are provided at major intersection crossing points. During peak hours, however, pedestrian movements were recorded and found to be light, therefore not impacting traffic flow to any significant degree.

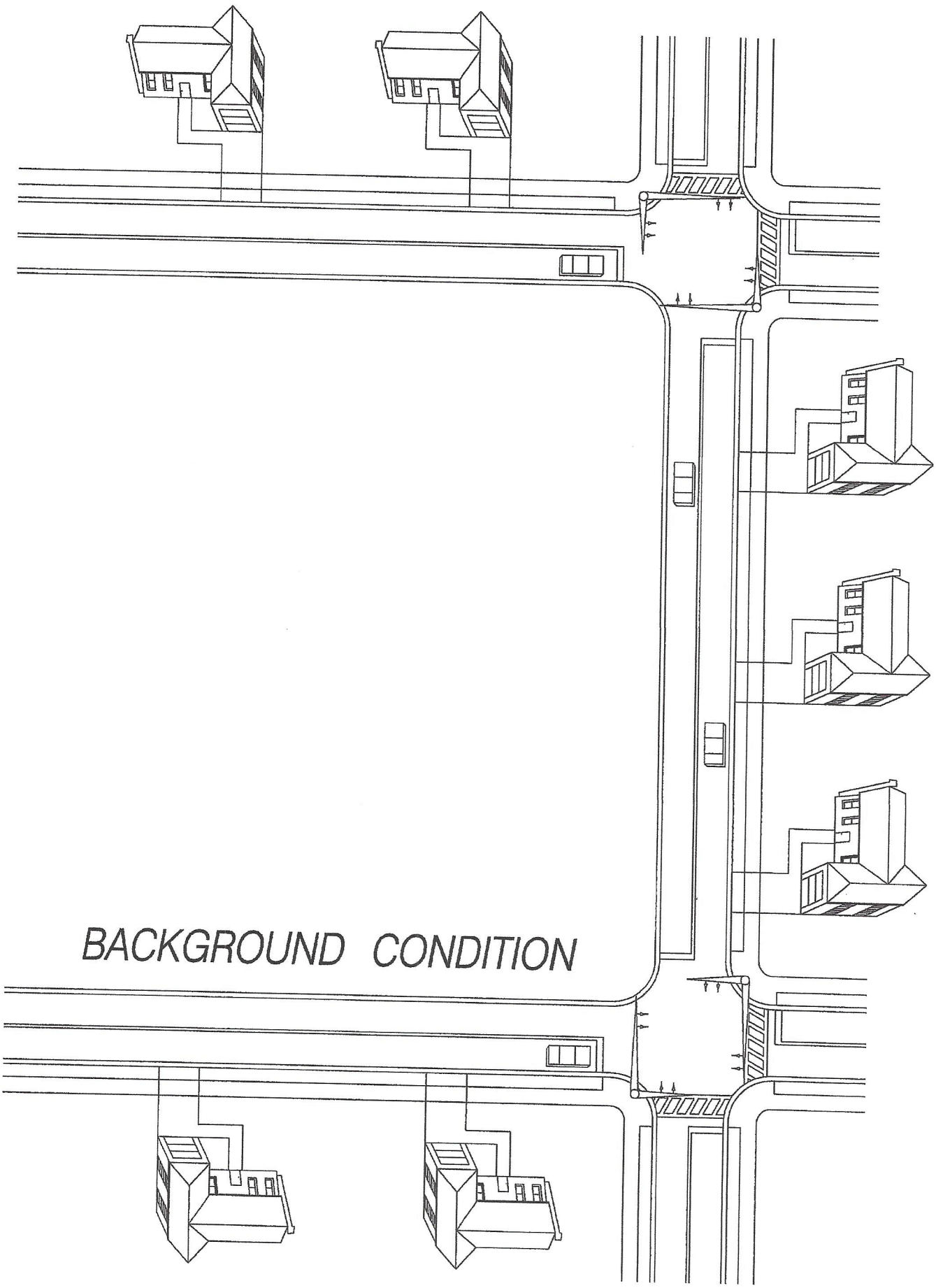
The Bay Ridge Road corridor provides arterial access to the west to Parole, US 50, I-97 and beyond for a significant number of residential units located along the Bay Ridge Road corridor. The study corridor is lined with neighborhood type commercial uses such as restaurants, specialty retail choices and a large grocery store.

Bay Ridge Road in the study area is generally flat with no vertical alignment changes. Excellent sight lines are provided along the corridor to both vehicles entering the roadway from driveway accesses and vehicle queues along the corridor associated with the traffic signal operation.

This section of Bay Ridge Road does provide public bus service. Several bus stops are located along the corridor. A map is included on the following page that shows the available bus routes and stops along the corridor.

Forest Drive – from east of Hilltop Lane to east of Spa Road provides two through lanes in each direction and a two-way left turn lane. Sidewalks exist along both sides of the road. Little to no improvements have been made along this section of Forest Drive over the recent years. Spa Road crosses Forest Drive at a skewed intersection (not intersecting at 90 degree angles). The posted speed limit along this section of Forest Drive is also 40 MPH and during peak travel time speeds are at or below this posted speed. This section of Forest Drive carries approximately 35,050 vehicles per day.


U.S. Naval Academy
Gate 1
St. John's College
State Circle
Church Circle
City Dock
Eastport
Severn River
South River
Robinwood
Hilltop Lane
West Street
Ridgely Ave.
Bestgate Rd.
Bestgate Park
Jennifer Rd.
Gateway Village
Festival Annapolis Plaza
A.A. Medical Center
Germantown Elementary School
Public Library
Poplar St. Park
Mills Parole School
Festival at Riva
Annapolis Harbour Center
Route 50/301
Wiley Bates Senior Center & Boys & Girls Clubs
Westgate Circle
Clock Tower Place
Annapolis Middle School
Annapolis Market Place
Annapolis Elementary School
Eastport Elementary School
Back Creek
Back Creek Nature Park
Eastport Plaza
SPCA Nature Preserve
Georgetown East School
Hillsmere Elementary School
College Creek
Spa Creek
Weems Creek
Market House
SOLOMONS ISLAND ROAD
Gold Route, South Loop to Edgewater
Gold Route, North Loop to Arnold/AACC
Visitors Information & Rest Rooms
Parking Facility
Map is not to scale



BACKGROUND CONDITION

BACKGROUND CONDITION

The second level of analysis will include the regional growth projected along the Forest Drive corridor to the design build out year of the proposed Chesapeake Grove project which is assumed at three (3) years. We have applied a growth factor of 2.0% per the City of Annapolis.

Background conditions also include the impact of active projects that may impact the study road intersections but are not yet constructed. A list of developments was provided by the City of Annapolis, which includes six (6) such developments. Locations of these developments are shown on Exhibit 4. Using the Institute of Transportation Engineers', Trip Generation Manual, 9th Edition, generation rates were determined for each development during the weekday AM, weekday PM and Saturday noontime peak periods. The results are listed on the following pages.

We have distributed the traffic generated by each background development through the study area based on the location of work centers and major access routes. Details of each individual development can be found in Appendix I of this report.

Exhibits 5 and 6 show the impact of regional growth and background vehicle trips respectively and Exhibit 7 shows the Total Background Traffic Volumes.

Using these volumes, each intersection has been analyzed utilizing the SYNCHRO program. The signal timing/phasing and offsets have not been modified under this condition. Although it is assumed that the signal system along the corridor will be monitored and adjusted to reflect the increase in traffic flows, we have not optimized the signal timing/offsets at the direction of the City of Annapolis. Details of all calculations can be found in Appendices IV-A through IV-C of this report. The results are shown on the following page.

BACKGROUND CONDITION - SYNCHRO RESULTS

	AM Delay(LOS)	PM Delay(LOS)	SAT Delay(LOS)
Forest Drive @ Spa Road			
Eastbound	23.9 (C)	83.1 (F)	30.5 (C)
Westbound	56.0 (E)	16.9 (B)	13.8 (B)
Northbound	98.5 (F)	81.3 (F)	61.1 (E)
Southbound	77.5 (E)	84.6 (F)	58.4 (E)
Overall Intersection	**50.4 (D)**	**58.8 (E)**	**27.1 (C)**
Forest Drive @ Tyler Avenue			
Eastbound	6.8 (A)	8.5 (A)	7.7 (A)
Westbound	12.4 (B)	6.4 (A)	7.2 (A)
Northbound	62.2 (E)	72.5 (E)	46.3 (D)
Southbound	56.9 (E)	44.4 (D)	36.5 (D)
Overall Intersection	**13.5 (B)**	**11.1 (B)**	**9.0 (A)**
Forest Drive @ Annapolis Neck Road			
Eastbound	1.2 (A)	3.0 (A)	9.0 (A)
Westbound	6.4 (A)	3.1 (A)	3.5 (A)
Northbound	45.9(D)	29.3(C)	30.6 (C)
Southbound	6.6 (A)	2.7 (A)	1.8 (A)
Overall Intersection	**5.5 (A)**	**3.5 (A)**	**6.8 (A)**
Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive			
Eastbound	14.3 (B)	18.9 (B)	14.9 (B)
Westbound	33.2 (C)	30.5 (C)	25.3 (C)
Northbound	63.8 (E)	67.3 (E)	55.1 (E)
Southbound	67.4 (E)	67.7 (E)	55.6 (E)
Overall Intersection	**36.8 (D)**	**36.7 (D)**	**31.3 (C)**
Bay Ridge Road @ Georgetown Road			
Eastbound	4.2 (A)	9.3 (A)	8.1 (A)
Westbound	8.9 (A)	17.1 (B)	15.1 (B)
Northbound	3.2 (A)	44.7 (D)	33.7 (C)
Southbound	56.0(E)	42.1 (D)	36.4 (D)
Overall Intersection	**12.2 (B)**	**17.3 (B)**	**15.8 (B)**
Bay Ridge Road @ Edgewood Road			
Eastbound	9.9 (A)	12.8 (B)	7.0 (A)
Westbound	21.5 (C)	26.9 (C)	20.6 (C)
Northbound	36.2 (D)	47.4 (D)	38.0 (D)
Southbound	32.5 (C)	32.6 (C)	24.0 (C)
Overall Intersection	**20.0 (B)**	**21.7 (C)**	**17.0 (B)**

The City of Annapolis traffic impact study guidelines require that the overall intersection operate at an acceptable "D" or better level of service to determine adequacy. The above chart shows the delay and level of service for each approach at the study intersections as well as the overall intersection delay/level of service. As noted, several of the side road approaches operate at "E" and "F" levels of service. This is to be expected for side road approaches along a corridor such as Forest Drive/Bay Ridge Road. When signal cycle lengths reach 120 seconds and the majority of the cycle time is given to the mainline (in order to achieve progression), the side road approaches are given a small portion of the cycle length. Therefore, the side road approaches are forced to wait the majority of the cycle length, typically longer than the 55 seconds that will generate an "E" level of service. The results of this study show that the side road approaches will not double-cycle and will experience acceptable delays.

BACKGROUND DEVELOPMENTS

	AM		PM		SAT	
	IN	OUT	IN	OUT	IN	OUT
1. Parkside Preserve						
ITE Land Use Code 210						
86 sfu	volumes taken directly from TIS prepared for Parkside Preserve prepared by McMahon					
ITE Land Use Code 230						
72 thu						
2. Bay Village	volumes taken directly from TIS prepared for Bay Village					
Assisted Living						
ITE Land Use Code 254						
88 beds						
Starbucks						
ITE Land Use Code 934						
Cofee/Donut Shop w/ Drive-Thru						
Per ksf	51.30	49.28	21.40	21.40	42.26	42.26
1,850 gsf	95	91	40	39	78	78
Less 50% passby	- 48	- 45	- 20	- 19	- 39	- 39
New Trips	**47**	**46**	**20**	**20**	**39**	**39**
3. 1503 Forest Drive *						
ITE Land Use Code 710						
General Office						
Per ksf	2.35	0.32	0.90	4.37	0.23	0.20
18,900 gsf	44	6	17	83	4	4
ITE Land Use Code 852						
Convenience Market						
Per ksf	15.51	15.51	16.94	17.63	16.94	17.63
2,460 gsf	38	38	42	43	42	43
Passby trips	- 19	- 19	- 26	- 26	- 26	- 26
New Trips	19	19	16	17	16	17
ITE Land Use Code 936						
Coffee/Donut Shop w/ Drive-Thru						
Per ksf	55.27	53.11	20.38	20.38	31.66	34.30
1,320 gsf	73	70	27	27	42	45
Passby Trips	- 36	- 34	- 14	- 14	- 21	- 22
New Trips	37	36	13	13	21	23

* Taken from approved TIS

BACKGROUND DEVELOPMENTS

	AM		PM		SAT	
	IN	OUT	IN	OUT	IN	OUT
4. 1415 Forest Drive						
ITE Land Use Code 826						
Specialty Retail Center						
Per ksf *	3.28	3.56	2.81	2.21	3.28**	3.56**
2,986 gsf	10	10	8	7	10	10
TOTAL BACKGROUNDS						
3 & 4	**110**	**71**	**54**	**120**	**51**	**54**
5. Thomas Woods						
ITE Land Use Code 230						
Townhouse						
Per thu	0.14	0.68	0.61	0.30	0.25	0.22
10 thu	**1**	**7**	**6**	**3**	**3**	**2**
6. Lidl Grocery Store ***						
ITE Land Use Code 850						
Supermarket						
36,170 gsf	76	47	187	180	196	189
Less passby	- 0	- 0	- 67	- 65	- 71	- 68
New Trips	**76**	**47**	**120**	**115**	**125**	**121**

* In order to create a worse-case scenario, we have used AM and PM peak hour of the generator rates.
** Since no Saturday rates are available, we have used AM rates.
*** AM & PM trips taken from TIS prepared for this development

1. Parkside Preserve
2. Bay Village
3. 1503 Forest Drive
4. 1415 Forest Drive
5. Thomas Woods
6. Lidl Grocery Store

NOT TO SCALE

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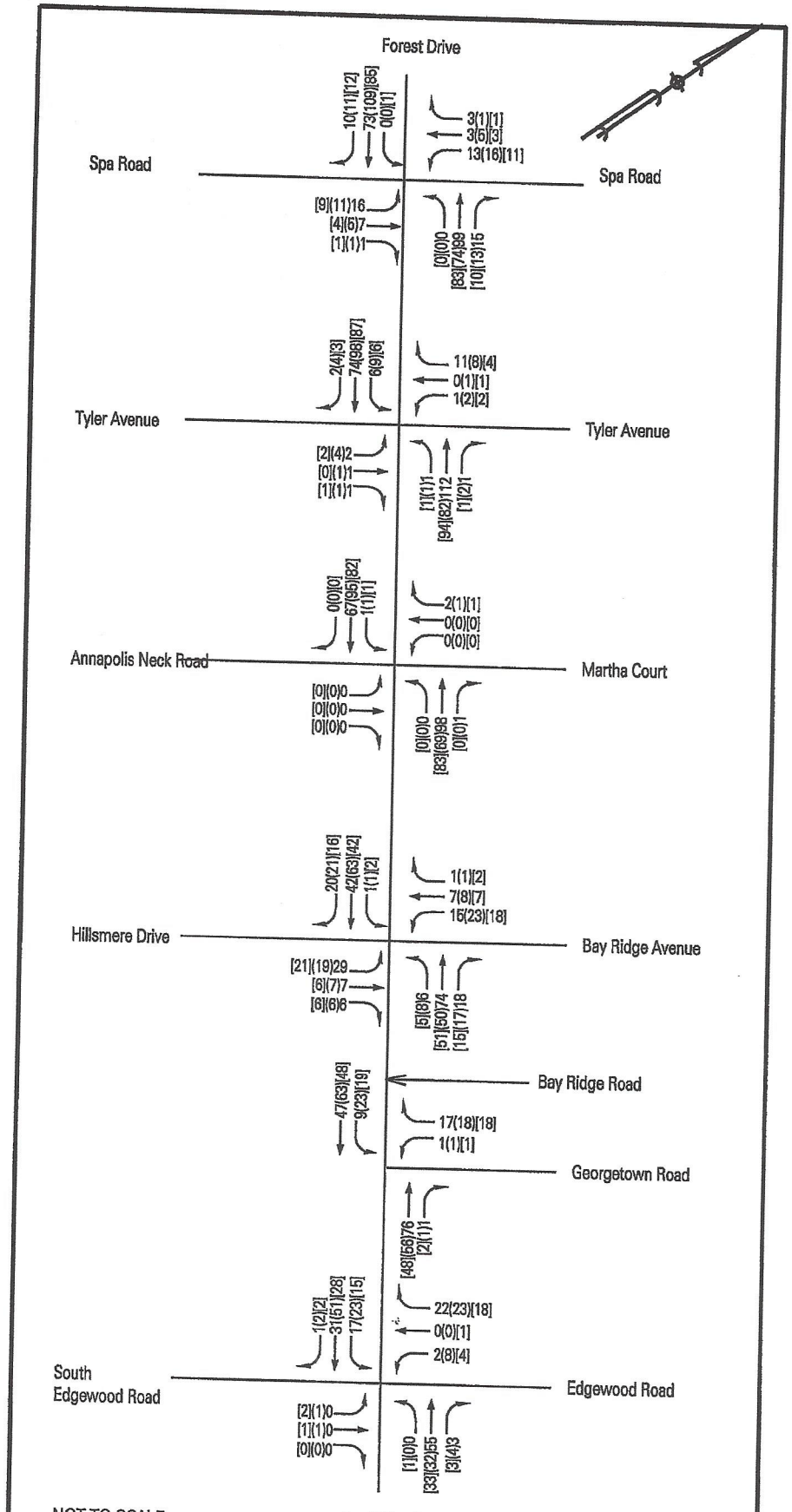
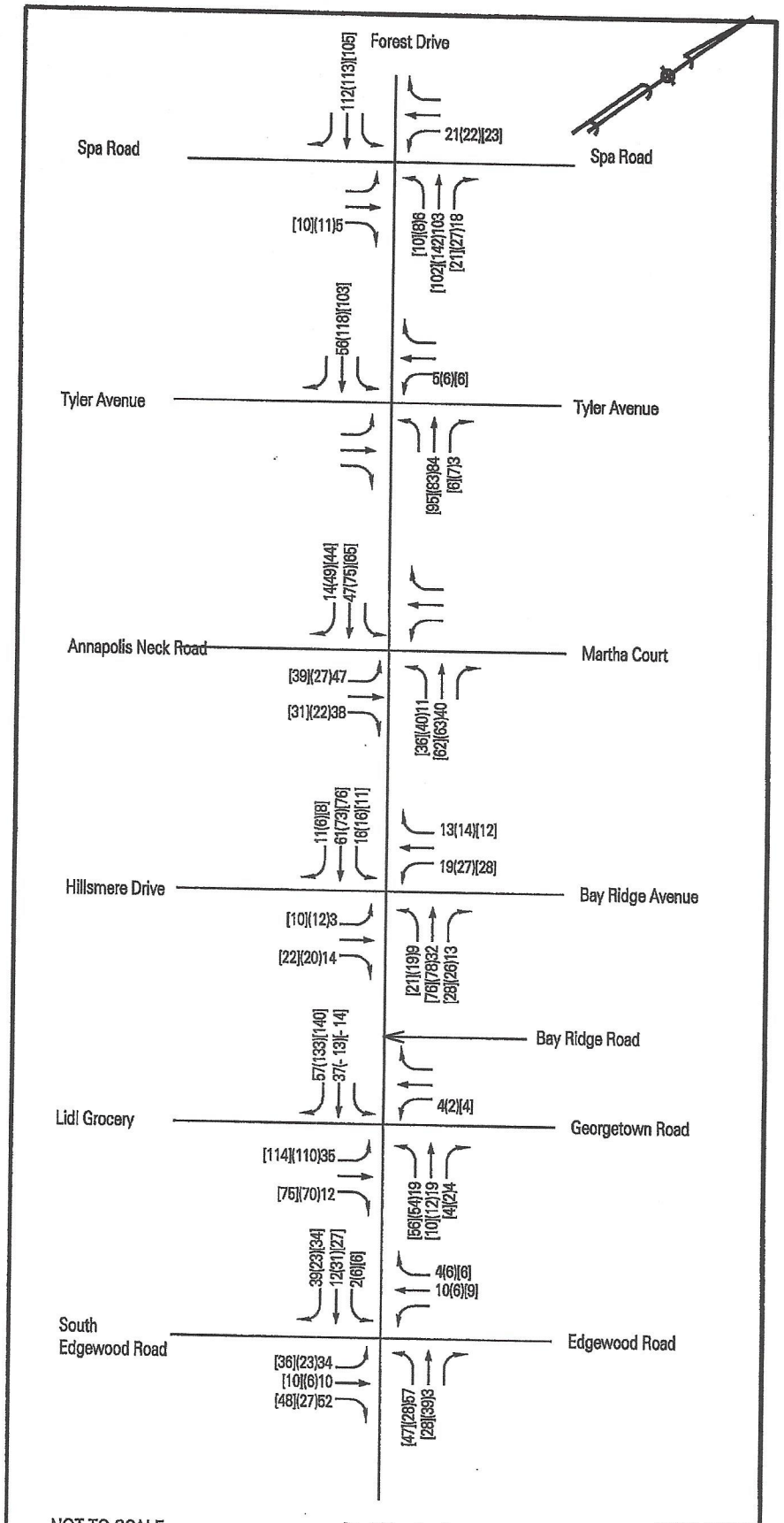
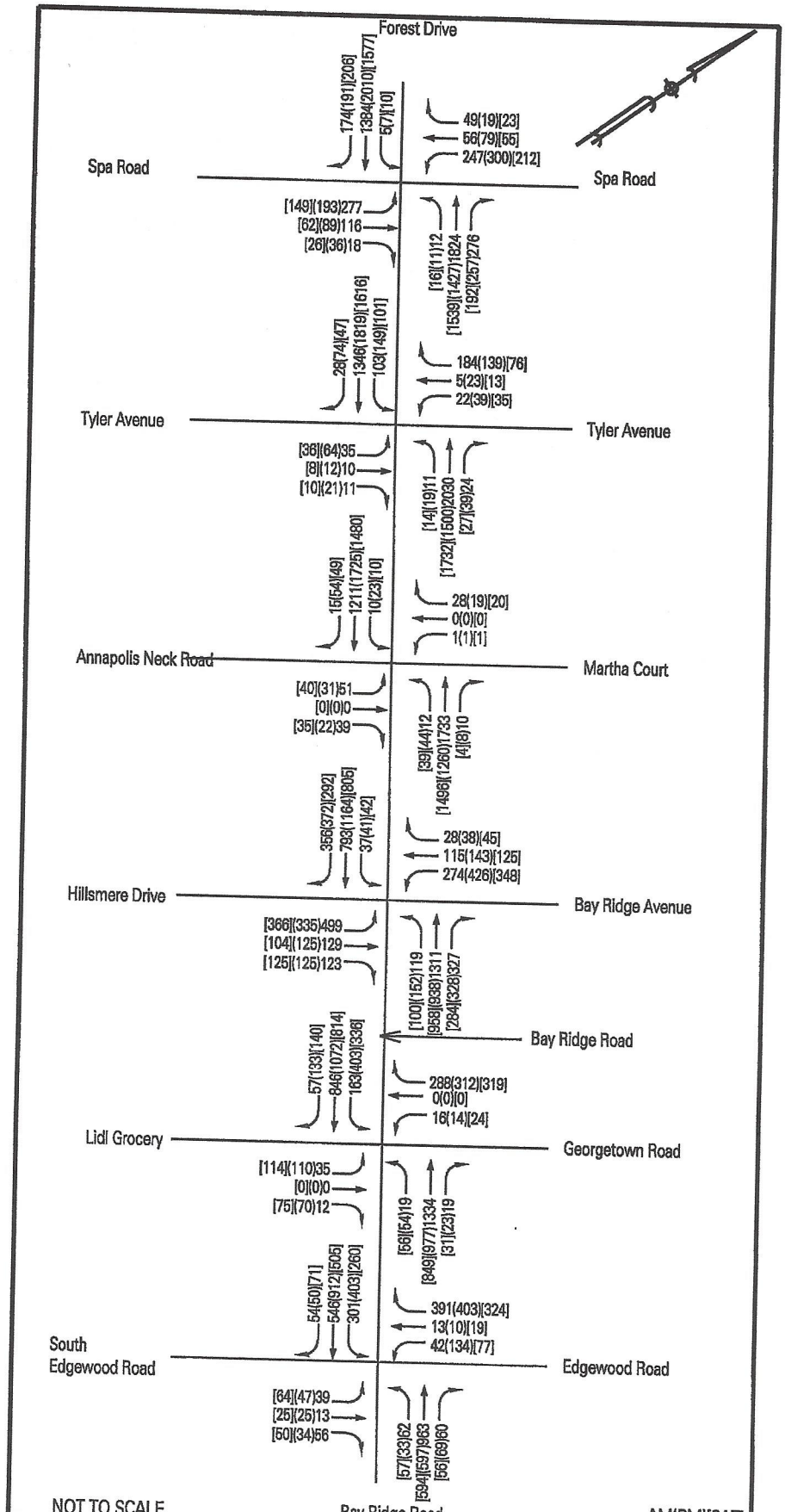
EXHIBIT 4
Background Development Locations



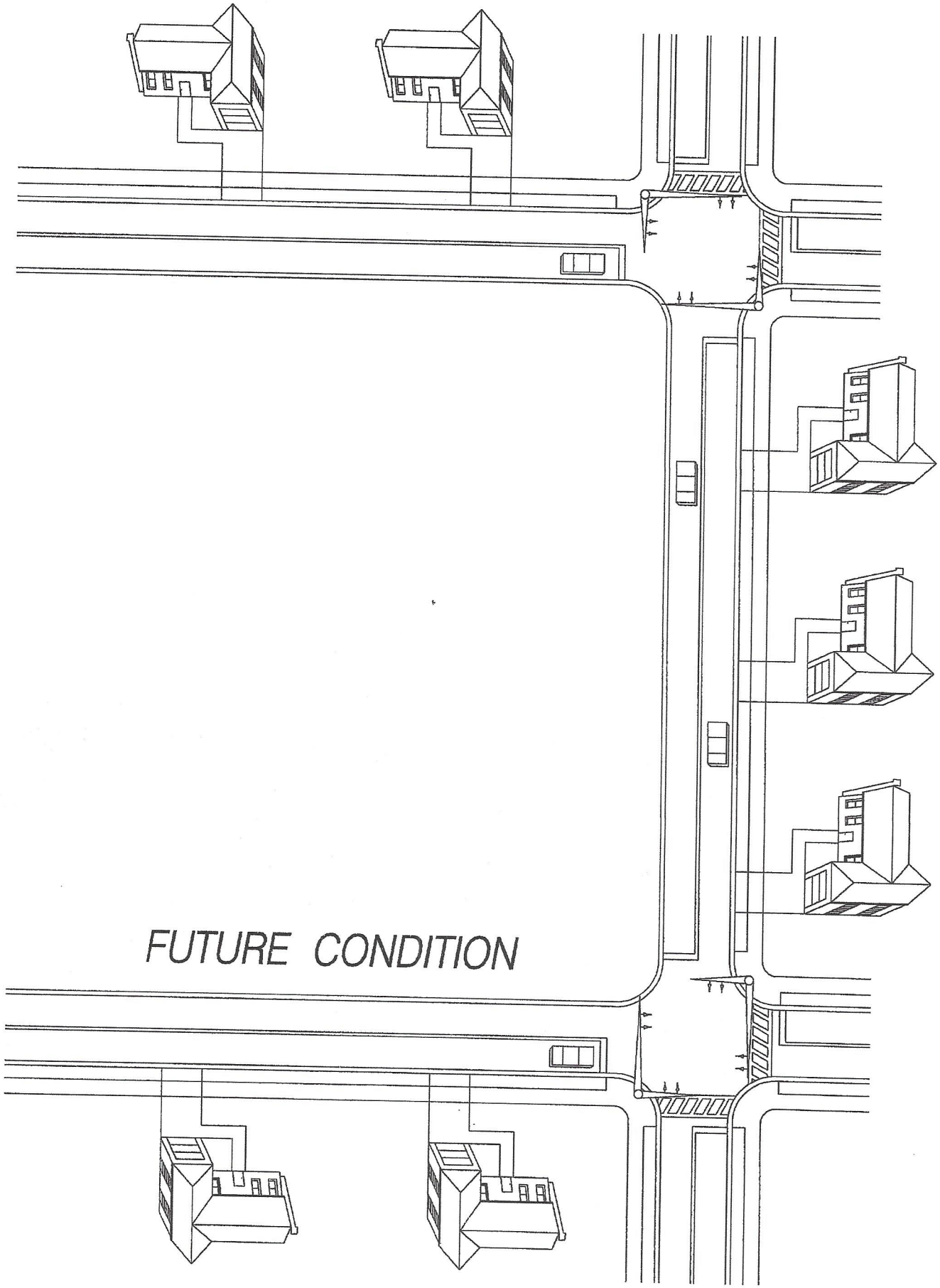
TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 5 Projected Growth Rates (2.0% for three years)



TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 6 Background Traffic Volumes



TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 7 Total Background Traffic Volumes


FUTURE CONDITION

FUTURE CONDITION

The final level of analysis will include the impact of the proposed Chesapeake Grove development. As mentioned previously, the project will create 45 residential townhomes. We have consulted the Institute of Transportation Engineers', Trip Generation Manual, 9th Edition to determine trip generation rates during the weekday AM, weekday PM and Saturday noontime peak periods for the project. The results are as follows:

	AM		PM		SAT	
	IN	OUT	IN	OUT	IN	OUT
Chesapeake Grove						
ITE Land Use Code 230						
Per thu	0.10	0.50	0.47	0.23	0.67	0.57
45 thu	**5**	**22**	**21**	**10**	**30**	**26**

We have distributed the traffic generated by this project through the study area based on location of work centers and major access routes. The results are shown on Exhibit 8. By adding the site generated trips to total background traffic volumes, we obtain total future traffic volumes. (See Exhibit 9)

Using these volumes, each intersection has been analyzed utilizing the SYNCHRO program. The signal timing/phasing and offsets have not been modified under this condition. Although it is assumed that the signal system along the corridor will be monitored and adjusted to reflect the increase in traffic flows, we have not optimized the signal timing/offsets at the direction of the City of Annapolis. Details of all calculations can be found in Appendices V-A through V-C of this report. The results are shown on the following page.

FUTURE CONDITION - SYNCHRO RESULTS

	AM Delay(LOS)	PM Delay(LOS)	SAT Delay(LOS)
Forest Drive @ Spa Road			
Eastbound	24.0 (C)	86.2 (F)	31.7 (C)
Westbound	57.7 (E)	17.1 (B)	14.9 (B)
Northbound	98.5 (F)	81.3 (F)	61.1 (E)
Southbound	77.5 (E)	84.9 (F)	58.8 (E)
Overall Intersection	**51.2 (D)**	**60.5 (E)**	**28.1 (C)**
Forest Drive @ Tyler Avenue			
Eastbound	6.8 (A)	8.6 (A)	8.0 (A)
Westbound	12.6 (B)	6.4 (A)	7.4 (A)
Northbound	62.2 (E)	72.5 (E)	46.3 (D)
Southbound	56.9 (E)	44.6 (D)	36.5 (D)
Overall Intersection	**13.6 (B)**	**11.2 (B)**	**9.2 (A)**
Forest Drive @ Annapolis Neck Road			
Eastbound	1.2 (A)	3.1 (A)	9.1 (A)
Westbound	6.5 (A)	3.1 (A)	3.5 (A)
Northbound	45.9 (D)	29.3 (C)	30.6 (C)
Southbound	6.6 (A)	2.7 (A)	1.8 (A)
Overall Intersection	**5.5 (A)**	**3.5 (A)**	**6.8 (A)**
Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive			
Eastbound	14.5 (B)	19.4 (B)	15.1 (B)
Westbound	33.8 (C)	30.7 (C)	25.6 (C)
Northbound	63.8 (E)	67.4 (E)	55.1 (E)
Southbound	67.3 (E)	67.7 (E)	55.6 (E)
Overall Intersection	**37.1 (D)**	**36.9 (D)**	**31.4 (C)**
Bay Ridge Road @ Georgetown Road			
Eastbound	4.3 (A)	9.5 (A)	8.5 (A)
Westbound	9.2 (A)	17.1 (B)	17.1 (B)
Northbound	3.2 (A)	44.7 (D)	33.7 (C)
Southbound	56.0 (E)	42.3 (D)	36.5 (D)
Overall Intersection	**12.3 (B)**	**17.3 (B)**	**16.5 (B)**
Bay Ridge Road @ Edgewood Road			
Eastbound	10.2 (B)	13.9 (B)	7.8 (A)
Westbound	21.8 (C)	28.2 (C)	22.4 (C)
Northbound	36.2 (D)	47.4 (D)	38.0 (D)
Southbound	34.9 (C)	32.4 (C)	24.5 (C)
Overall Intersection	**20.7 (C)**	**22.6 (C)**	**18.0 (B)**

The City of Annapolis traffic impact study guidelines require that the overall intersection operate at an acceptable "D" or better level of service to determine adequacy. The above chart shows the delay and level of service for each approach at the study intersections as well as the overall intersection delay/level of service. As noted, several of the side road approaches operate at "E" and "F" levels of service. This is to be expected for side road approaches along a corridor such as Forest Drive/Bay Ridge Road. When signal cycle lengths reach 120 seconds and the majority of the cycle time is given to the mainline (in order to achieve progression), the side road approaches are given a small portion of the cycle length. Therefore, the side road approaches are forced to wait the majority of the cycle length, typically longer than the 55 seconds that will generate an "E" level of service. The results of this study show that the side road approaches will not double-cycle and will experience acceptable delays.

We would also note that the County has implemented a system timing operation which adjusts timing and offset patterns for the corridor based on real-time traffic flow conditions. This system cannot be accurately modeled in the SYNCHRO program, however, we would assume an improvement in overall delay times above those included in this report.

Using the total future traffic volumes, we have determined the 95th percentile queue lengths (obtained from the SimTraffic program) at existing turn bays at each key intersection. The results are based on an average of five (5) traffic simulation runs, with a 15-minute seeding time and 60-minute recording time. Details of the calculations can be found in Appendices IVA-C and VA-C of this report. The results are shown on the following page.

Intersection	Movement	Length of Turn Bay	AM PEAK Projected 95th Queue (SIMTRAFFIC)		PM PEAK Projected 95th Queue (SIMTRAFFIC)		SAT PEAK Projected 95th Queue (SIMTRAFFIC)	
			Background	Future	Background	Future	Background	Future
Forest Drive @ Spa Road	Side Approach NB Left	140' left lane – right lane is continuous	n/a	n/a	n/a	n/a	n/a	n/a
Forest Drive @ Tyler Ave	Mainline EB Left	150'	137'	128'	131'	130'	111'	103'
	Mainline WB Left	250'	49'	29'	48'	46'	32'	33'
Forest Drive @ Annapolis Neck Road	Mainline EB Left	105'	22'	23'	31'	33'	35'	35'
	Mainline WB Left	65'	26'	28'	51'	58'	49'	51'
Forest Drive @ Bay Ridge Ave – Hillsmere Dr	Mainline EB Left	150' (transitions to 325' long TWLTL*)	61'	78'	122'	95'	68'	85'
	Mainline WB Left	140'	185'	194'	194'	199'	193'	193'
	Side Approach NB Double Left	Total storage of 750'	577'	580'	454'	453'	456'	431'
	Side Approach SB Double Left	100' left lane – right lane is Continuous	n/a	n/a	n/a	n/a	n/a	n/a
Bay Ridge Road @ Georgetown Road	Mainline EB Left	190' (transitions to 420' long TWLTL*)	126'	130'	238'	234'	200'	203'
	Mainline WB Left	300' (Proposed by LIDL)	25'	28'	118'	77'	50'	51'
Bay Ridge Road @ Edgewood Road	Mainline EB Left	240' (transitions to 225' long TWLTL*)	234'	238'	228'	239'	149'	173'
	Mainline WB Left	150'	125'	129'	96'	91'	84'	89'
	Side Approach NB Thru/Left	125'	93'	97'	120'	114'	120'	123'

*Two-way left turn lane

Detailed Average Rate Trip Calculations
For 45 Dwelling Units of Residential Condominium / Townhouse(230) - [E]

Project: Rodgers Property
Phase:

Open Date:
Analysis Date:

Description:

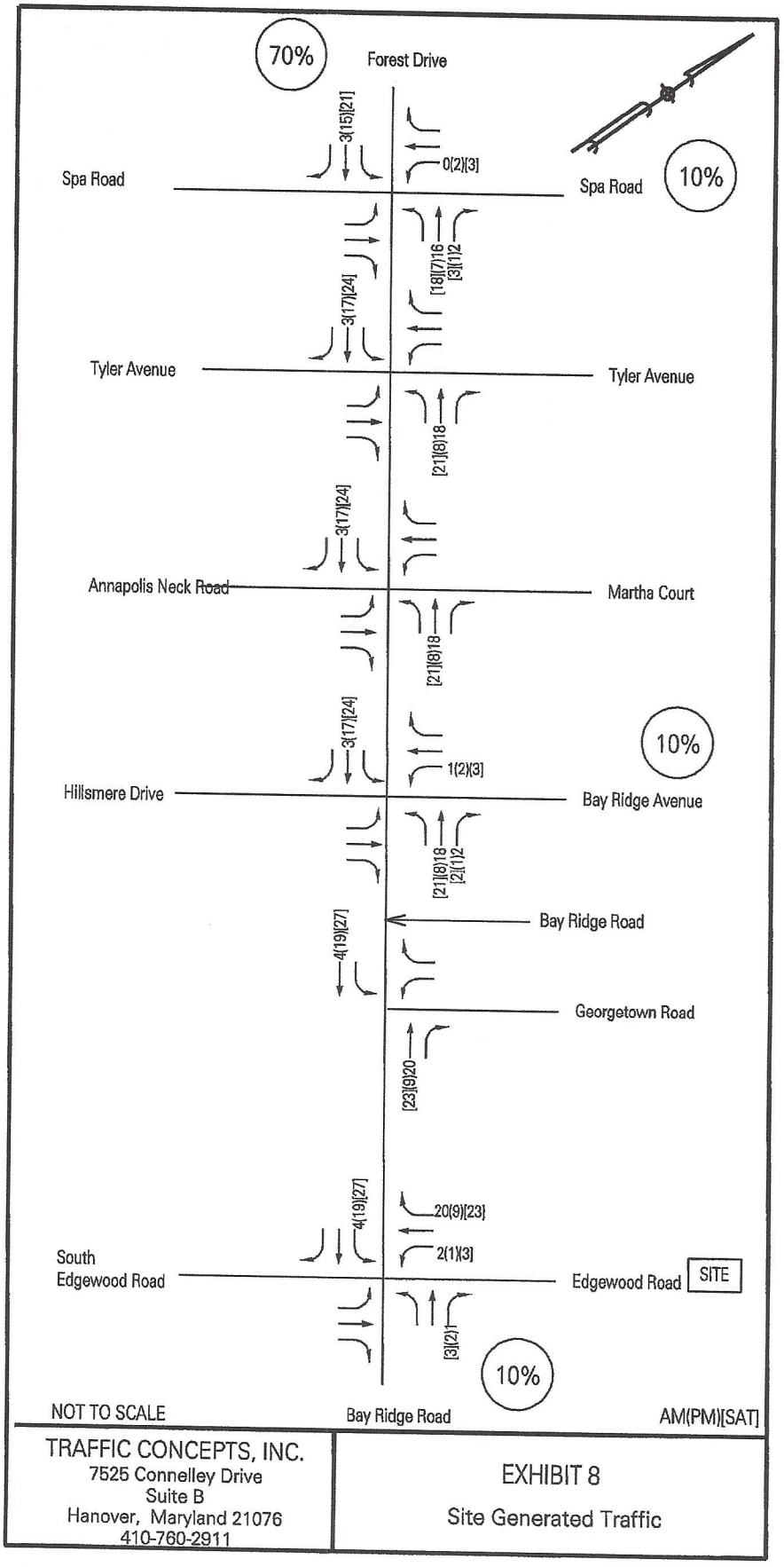
	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	7.14	0.00	1.00	321
7-9 AM Peak Hour Enter	0.10	0.00	1.00	5
7-9 AM Peak Hour Exit	0.50	0.00	1.00	22
7-9 AM Peak Hour Total	0.61	0.00	1.00	27
4-6 PM Peak Hour Enter	0.47	0.00	1.00	21
4-6 PM Peak Hour Exit	0.23	0.00	1.00	10
4-6 PM Peak Hour Total	0.69	0.00	1.00	31
AM Pk Hr, Generator, Enter	0.11	0.00	1.00	5
AM Pk Hr, Generator, Exit	0.47	0.00	1.00	21
AM Pk Hr, Generator, Total	0.59	0.00	1.00	26
PM Pk Hr, Generator, Enter	0.73	0.00	1.00	33
PM Pk Hr, Generator, Exit	0.41	0.00	1.00	18
PM Pk Hr, Generator, Total	1.14	0.00	1.00	51
Saturday 2-Way Volume	13.13	0.00	1.00	591
Saturday Peak Hour Enter	0.67	0.00	1.00	30
Saturday Peak Hour Exit	0.57	0.00	1.00	26
Saturday Peak Hour Total	1.24	0.00	1.00	56
Sunday 2-Way Volume	11.07	0.00	1.00	498
Sunday Peak Hour Enter	0.66	0.00	1.00	30
Sunday Peak Hour Exit	0.68	0.00	1.00	30
Sunday Peak Hour Total	1.34	0.00	1.00	60

The above rates were calculated from these equations:

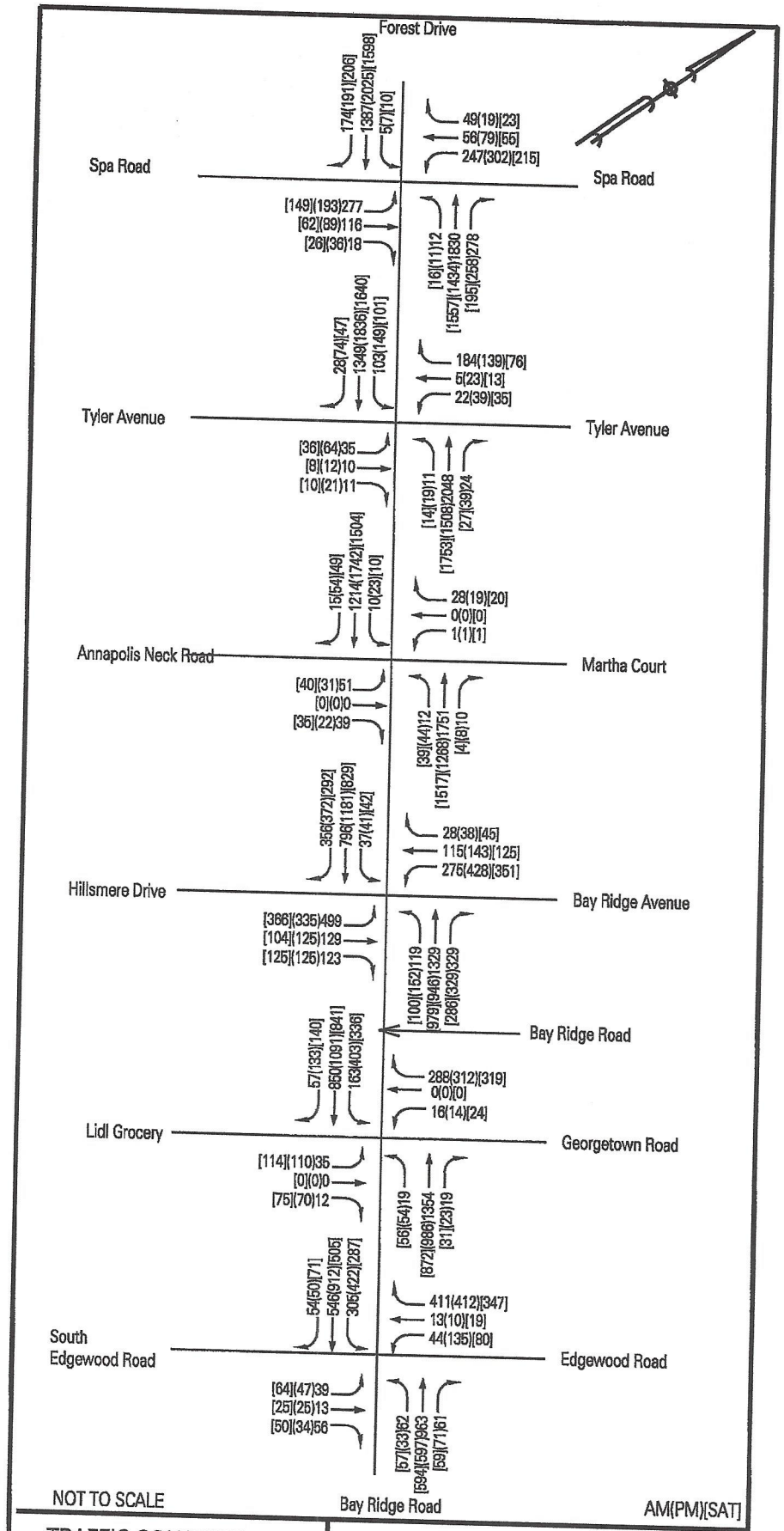
24-Hr. 2-Way Volume:	LN(T) = .87LN(X) + 2.46, R^2 = 0.8
7-9 AM Peak Hr. Total:	LN(T) = .8LN(X) + .26 R^2 = 0.76 , 0.17 Enter, 0.83 Exit
4-6 PM Peak Hr. Total:	LN(T) = .82LN(X) + .32 R^2 = 0.8 , 0.67 Enter, 0.33 Exit
AM Gen Pk Hr. Total:	LN(T) = .82LN(X) + .15 R^2 = 0.8 , 0.19 Enter, 0.81 Exit
PM Gen Pk Hr. Total:	T = .34(X) + 35.87 R^2 = 0.82 , 0.64 Enter, 0.36 Exit
Sat. 2-Way Volume:	T = 3.62(X) + 427.93, R^2 = 0.84
Sat. Pk Hr. Total:	T = .29(X) + 42.63 R^2 = 0.84 , 0.54 Enter, 0.46 Exit
Sun. 2-Way Volume:	T = 3.13(X) + 357.26, R^2 = 0.88
Sun. Pk Hr. Total:	T = .23(X) + 50.01 R^2 = 0.78 , 0.49 Enter, 0.51 Exit

Note: A zero indicates no data available.
Source: Institute of Transportation Engineers
Trip Generation Manual, 9th Edition, 2012

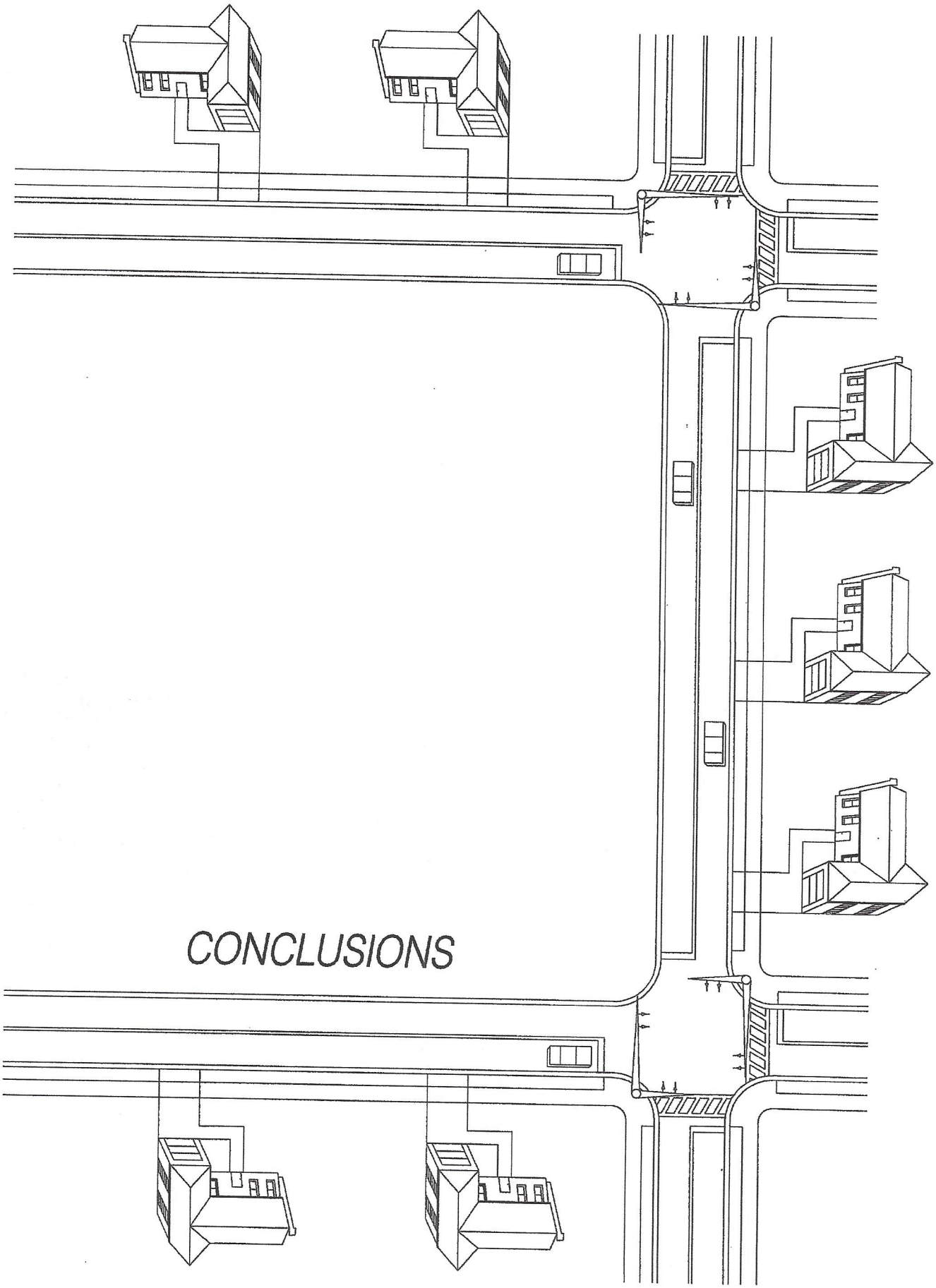
TRIP GENERATION 2013, TRAFFICWARE, LLC



TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 8 Site Generated Traffic



TRAFFIC CONCEPTS, INC. 7525 Connelley Drive Suite B Hanover, Maryland 21076 410-760-2911	EXHIBIT 9 Total Future Traffic Volumes



CONCLUSIONS

CONCLUSIONS

The traffic impact study indicates that from a SYNCHRO analysis standpoint, all intersections will operate at acceptable overall levels of service as dictated by the City of Annapolis Traffic Impact Study Guidelines, with the following exception:

The intersection of Forest Drive @ Spa Road is projected to operate at an overall "E" level of service (60.5 seconds per vehicle of overall delay) during the weekday evening peak period. With minor timing changes, this intersection could be improved to an acceptable "D" level of service. By transferring 5 seconds of green time from the northbound approach of Spa Road to the mainline of Forest Drive, the overall intersection delay can be improved to 52.9 seconds per vehicle ("D" level of service). A printout of the Synchro analysis results can be found on the following page.

In addition, the queuing analysis indicates that the 95th percentile queue will extend beyond the turn bay for the Bay Ridge Road westbound left turn into Hillsmere Drive. This turn bay is currently 140' in length, and the SimTraffic analyses indicate a future condition 95th percentile queue of 194' during the weekday morning peak, 199' during the weekday evening peak, and 193' during the Saturday noontime peak. The background condition (without the impact of the Chesapeake Grove project) analysis indicates queues of 185' during the morning peak, 194' during the evening peak, and 193' during the Saturday peak. Thus, the Chesapeake Grove project has an impact of 9' during the morning peak, 5' during the evening peak, and 0' during the Saturday peak. Since the

proposed development will have less than a 1-vehicle impact on the queues at this location, the Chesapeake Grove project should not be required to provide mitigation for this existing queue condition.