

REVISED
TRAFFIC IMPACT STUDY

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

Revised
October, 2017

Prepared For:
City of Annapolis

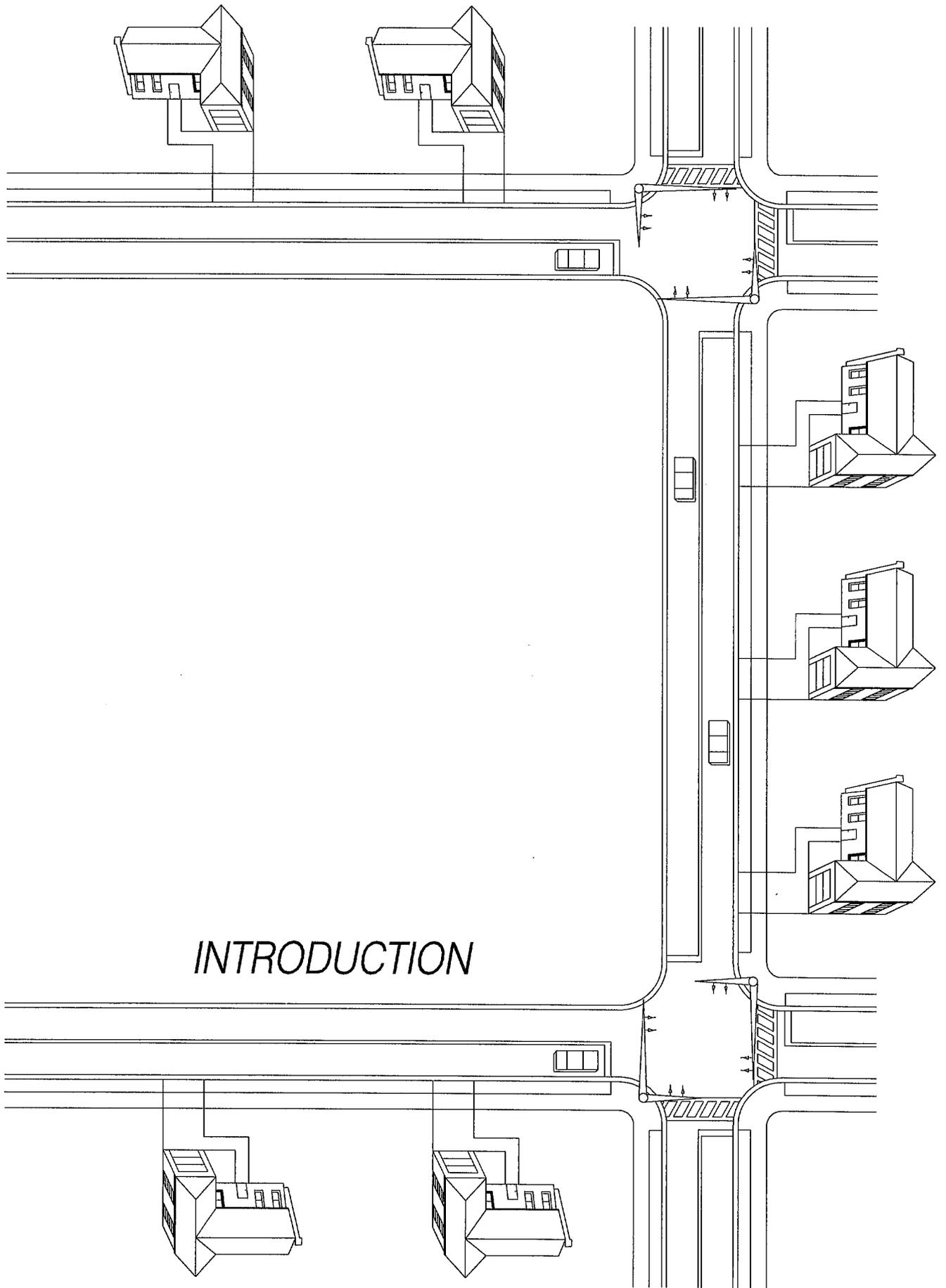
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INTRODUCTION

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.

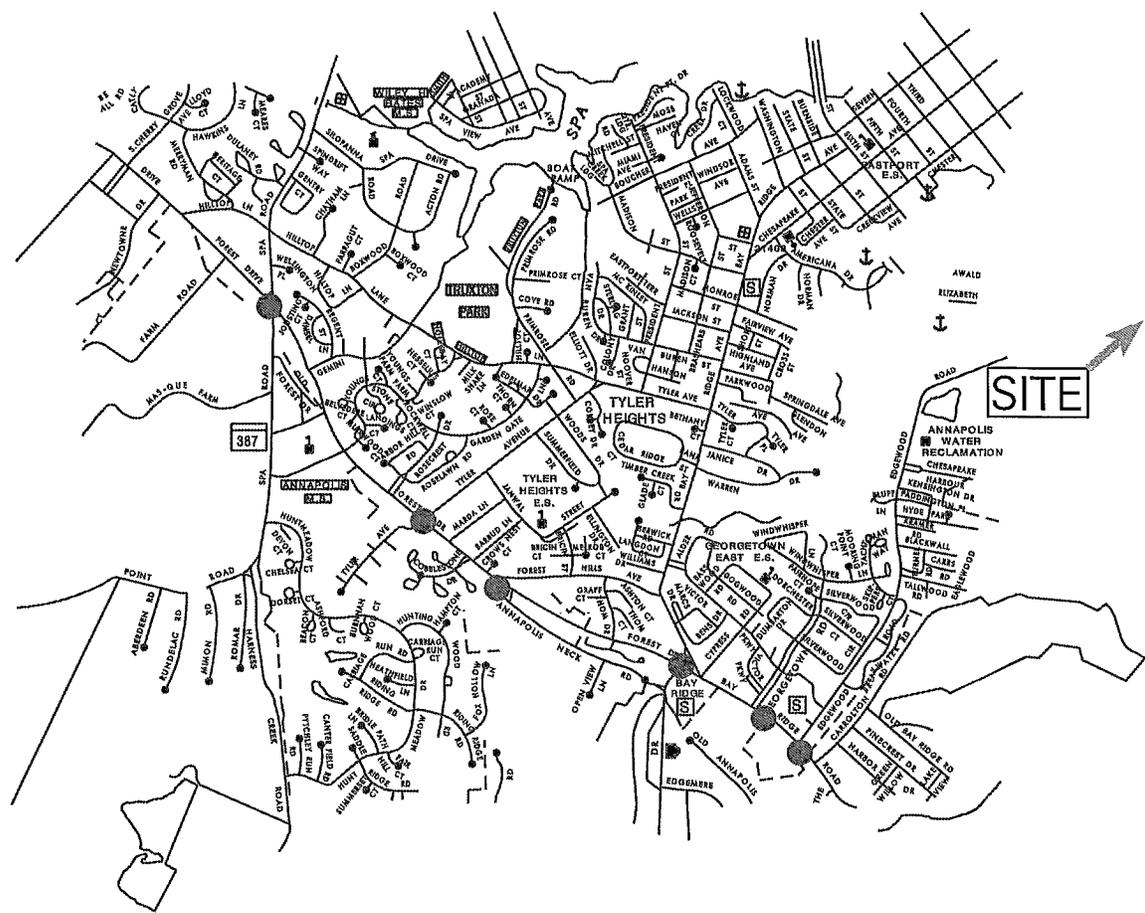
A scope of study was provided by the City of Annapolis, which established such parameters as key intersections, method of analysis, study time periods, etc. Based on the comments received from the City of Annapolis dated May 17, 2017, the scope of study was expanded to include two additional key intersections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

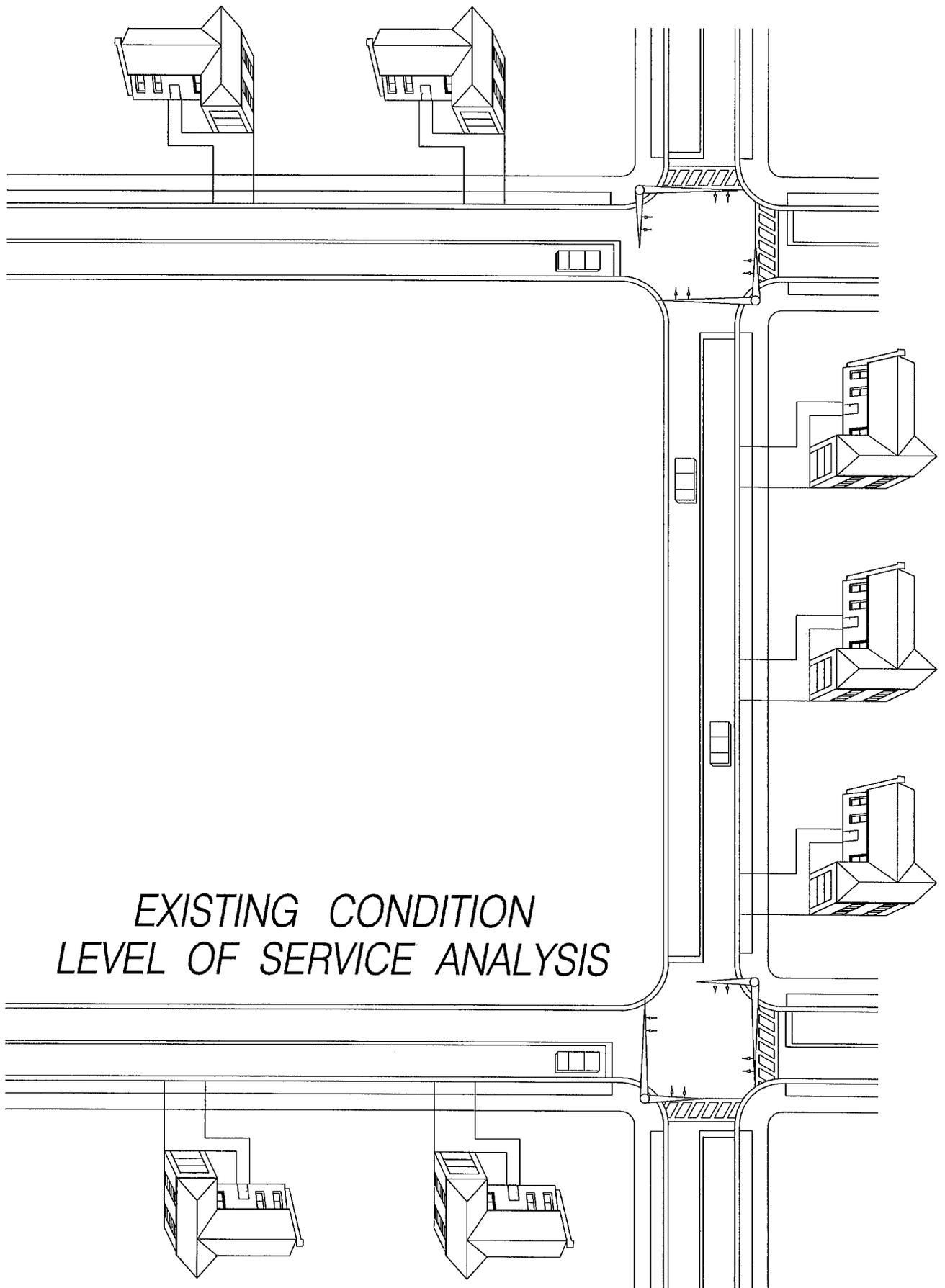
The traffic study will analyze the key intersections under existing, background and future conditions using the SYNCHRO program. The SimTraffic program will also be used to conduct a queuing analysis under background and future traffic conditions.



● - Intersection Studied

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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 II 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.

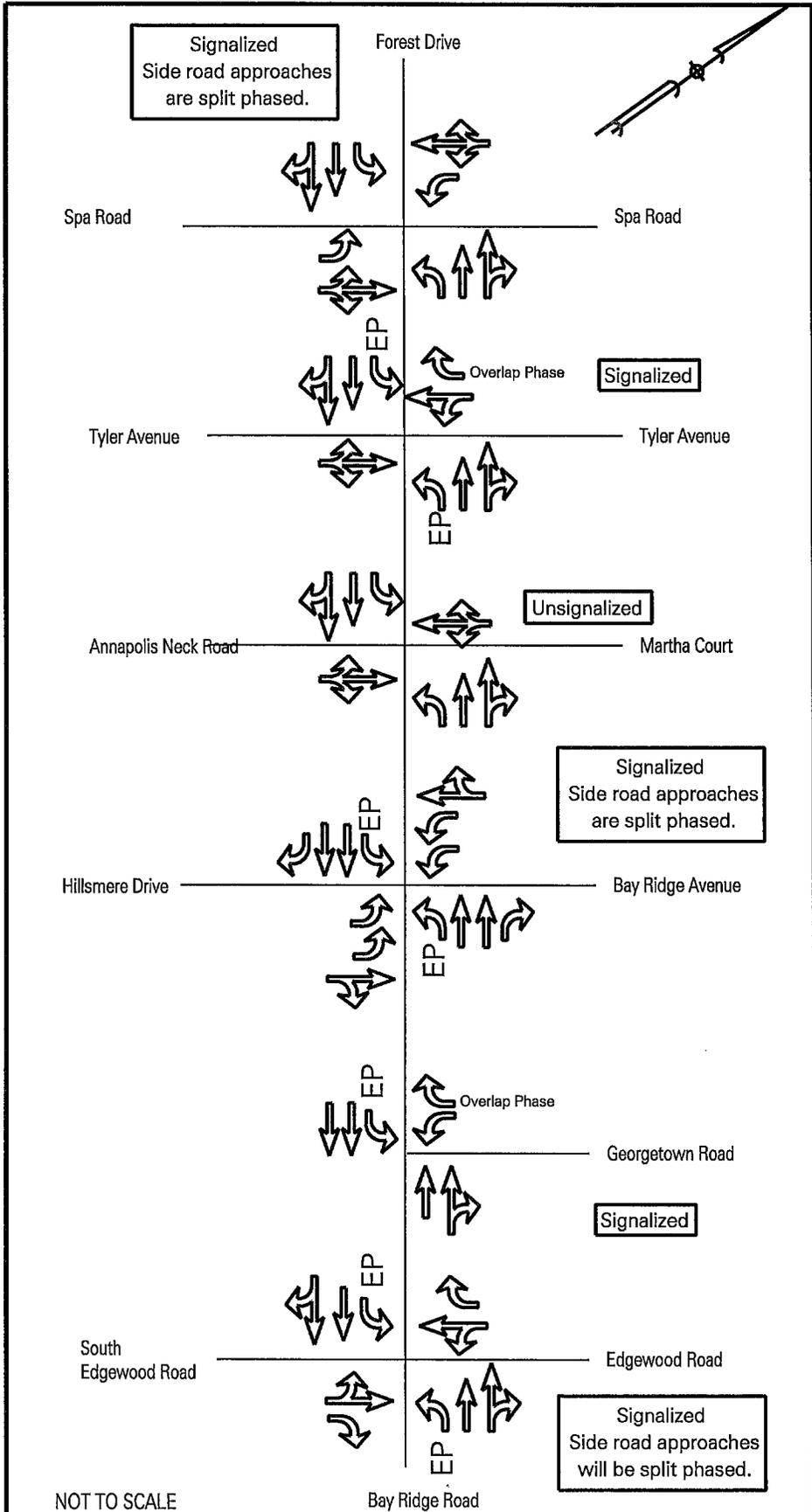
The SYNCHRO program will calculate intersection delays and assign a level of service based on that delay calculated from A to F. SYNCHRO is a macroscopic analysis that is based on the signalized intersection capacity analysis found in the Highway Capacity Manual. Equations are used to determine delay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

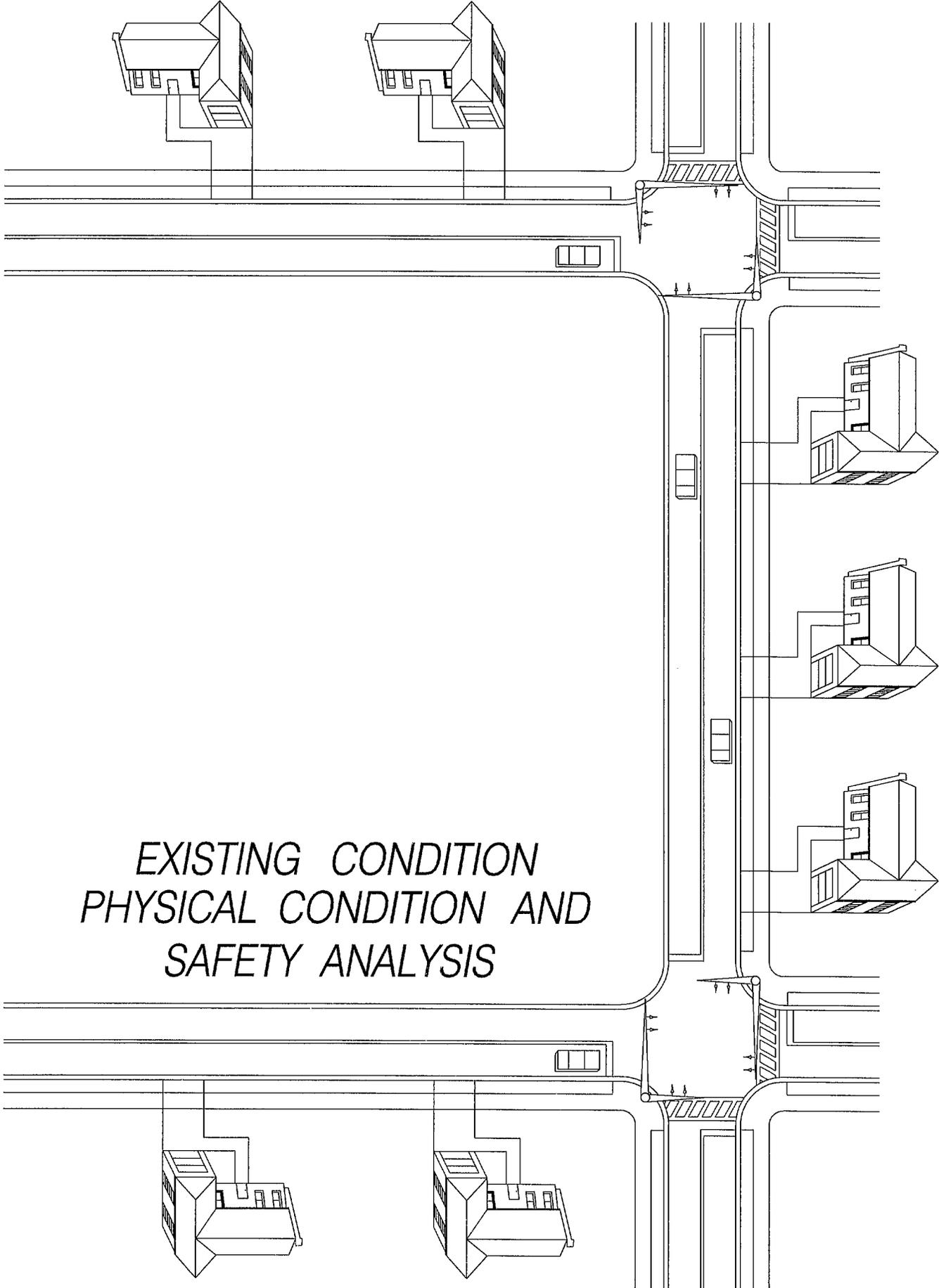
	<u>AM</u> <u>Delay(LOS)</u>	<u>PM</u> <u>Delay(LOS)</u>	<u>SAT</u> <u>Delay(LOS)</u>
<u>Forest Drive @ Spa Road</u>			
Eastbound	19.5 (B)	38.2 (D)	21.8 (C)
Westbound	21.3 (C)	9.8 (A)	5.8 (A)
Northbound	92.7 (F)	79.9 (E)	60.1 (E)
Southbound	74.1 (E)	80.7 (F)	57.9 (E)
Overall Intersection	31.8 (C)	34.9 (C)	19.8 (B)
<u>Forest Drive @ Tyler Avenue</u>			
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)
<u>Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive</u>			
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)
<u>Bay Ridge Road @ Georgetown Road</u>			
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)
<u>Bay Ridge Road @ Edgewood Road</u>			
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



*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.

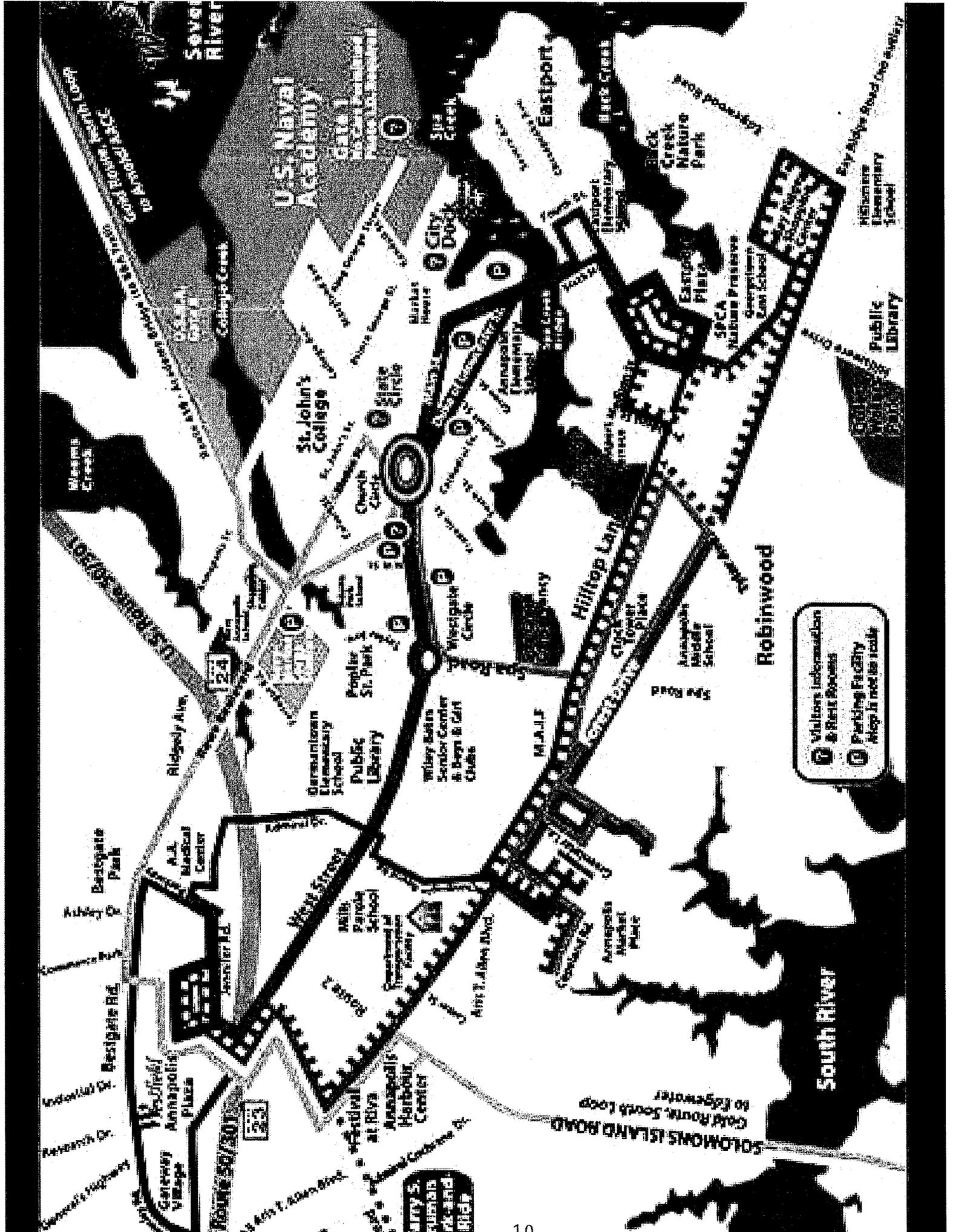
Sidewalks exist along each side of Bay Ridge Road. Pedestrian crosswalks and traffic signal indications are provided at major intersection crossing points. During peak hours, however, pedestrian movements were recorded and found to be light, therefore not impacting traffic flow to any significant degree.

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.

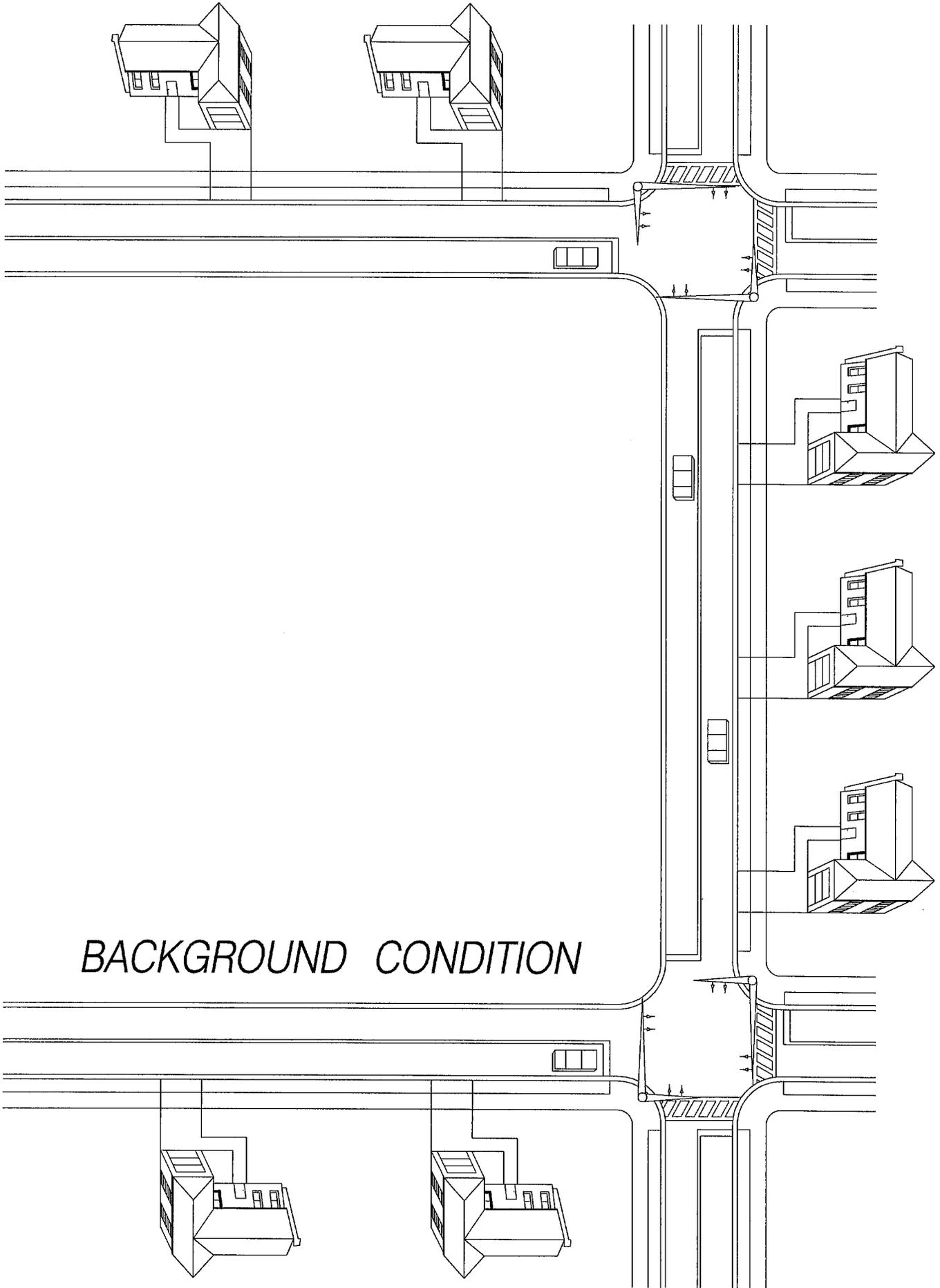
This section of Bay Ridge Road does provide public bus service. Several bus stops are located along the corridor. A map is included on the following page that shows the available bus routes and stops along the corridor.

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.



 Visitor Information & Rest Rooms
 Parking Facility
 Keep it neat & tidy

Army 5
 Guards
 Park-and-Ride



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

	<u>AM</u> <u>Delay(LOS)</u>	<u>PM</u> <u>Delay(LOS)</u>	<u>SAT</u> <u>Delay(LOS)</u>
<u>Forest Drive @ Spa Road</u>			
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)
<u>Forest Drive @ Tyler Avenue</u>			
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)
<u>Forest Drive @ Annapolis Neck Road</u>			
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)
<u>Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive</u>			
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)
<u>Bay Ridge Road @ Georgetown Road</u>			
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)
<u>Bay Ridge Road @ Edgewood Road</u>			
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

	<u>AM</u>		<u>PM</u>		<u>SAT</u>	
	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>
1. Parkside Preserve						
<u>ITE Land Use Code 210</u>						
86 sfu						
						volumes taken directly from TIS prepared for Parkside Preserve prepared by McMahon
<u>ITE Land Use Code 230</u>						
72 thu						
2. Bay Village						
Assisted Living						
<u>ITE Land Use Code 254</u>						
88 beds						
						volumes taken directly from TIS prepared for Bay Village
Starbucks						
<u>ITE Land Use Code 934</u>						
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 *						
<u>ITE Land Use Code 710</u>						
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
<u>ITE Land Use Code 852</u>						
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
<u>ITE Land Use Code 936</u>						
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	
	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>
4. 1415 Forest Drive						
<u>ITE Land Use Code 826</u>						
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						
<u>ITE Land Use Code 230</u>						
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 ***						
<u>ITE Land Use Code 850</u>						
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

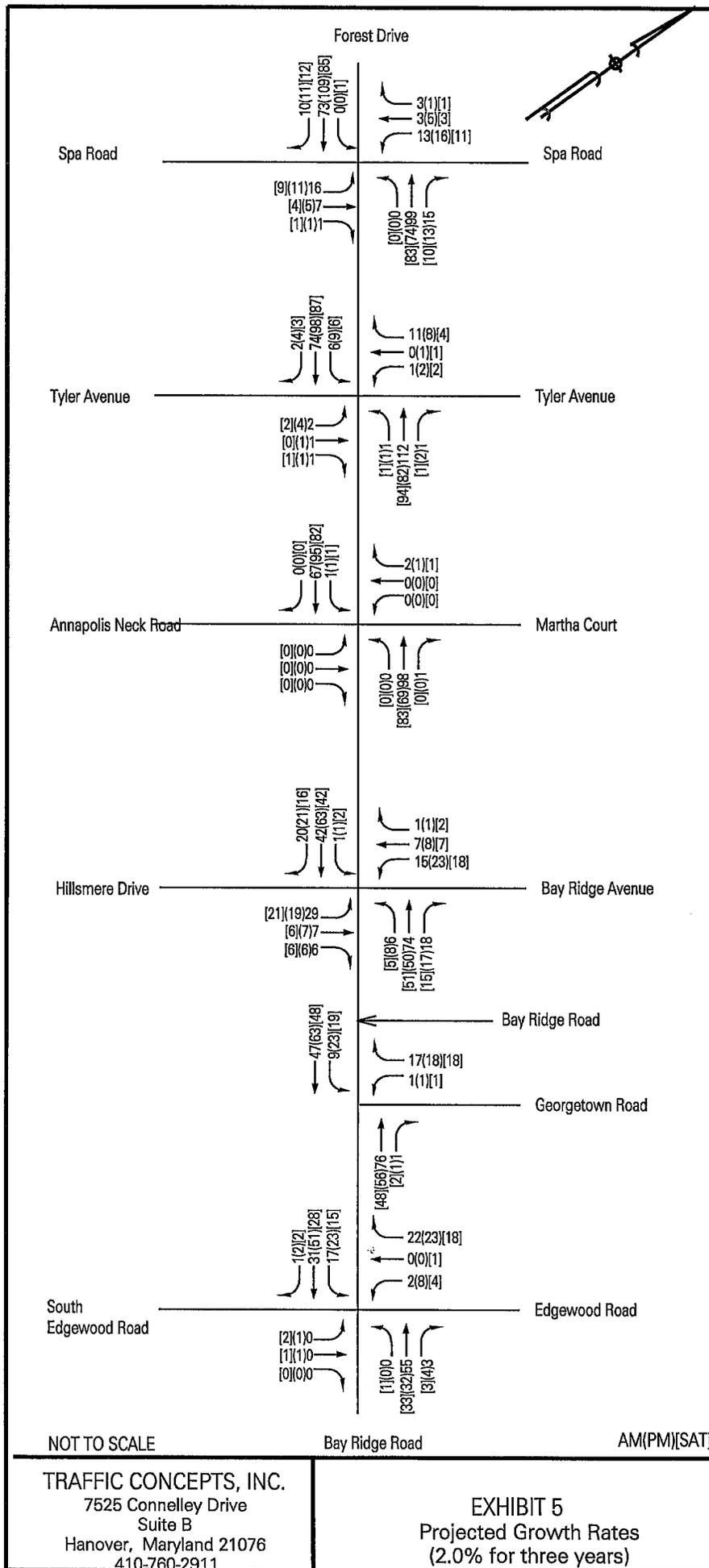


- 1. Parkside Preserve
- 2. Bay Village
- 3. 1503 Forest Drive
- 4. 1415 Forest Drive
- 5. Thomas Woods
- 6. Lidl Grocery Store

NOT TO SCALE

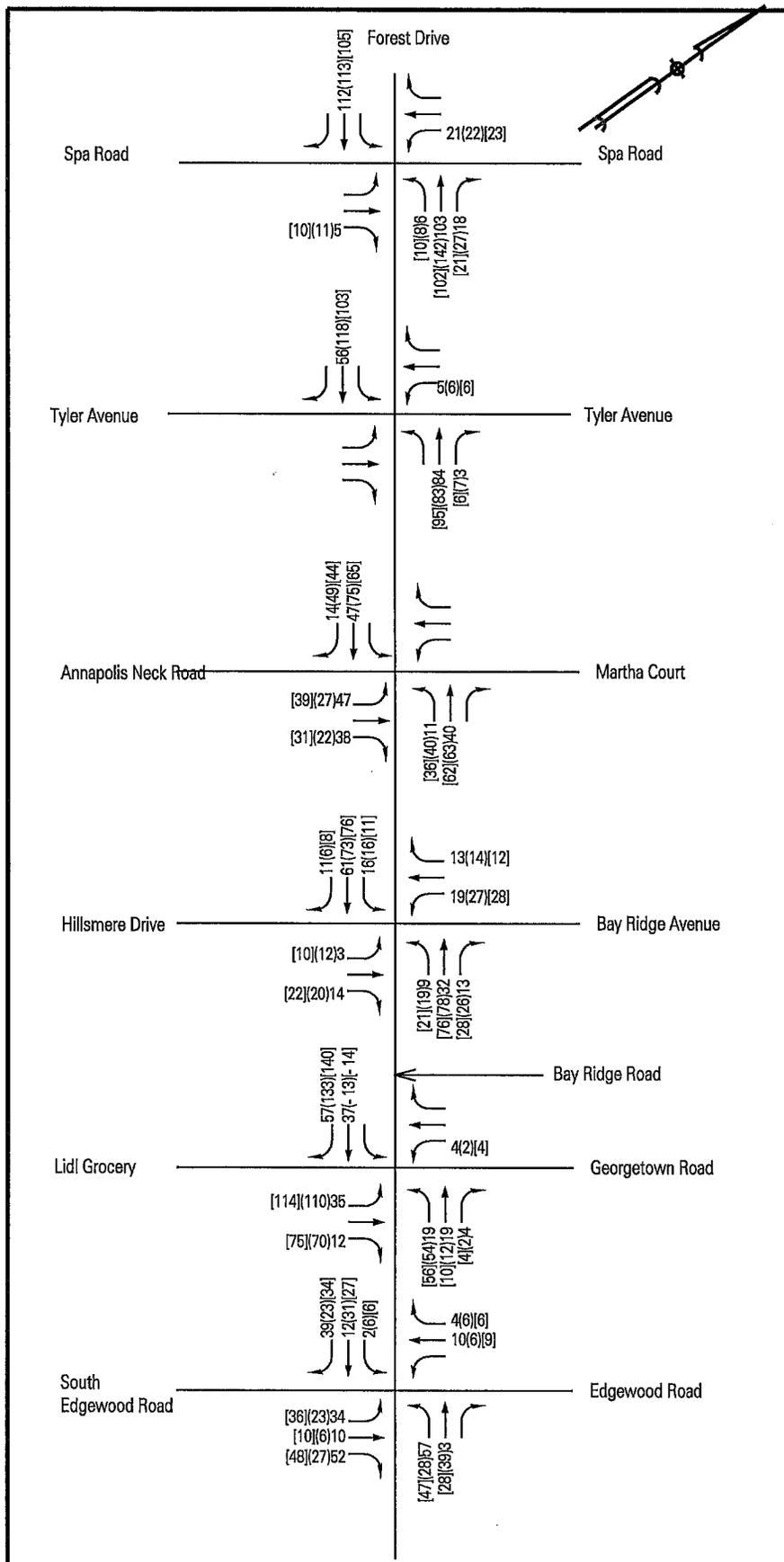
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EXHIBIT 4
Background Development Locations



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EXHIBIT 5
 Projected Growth Rates
 (2.0% for three years)



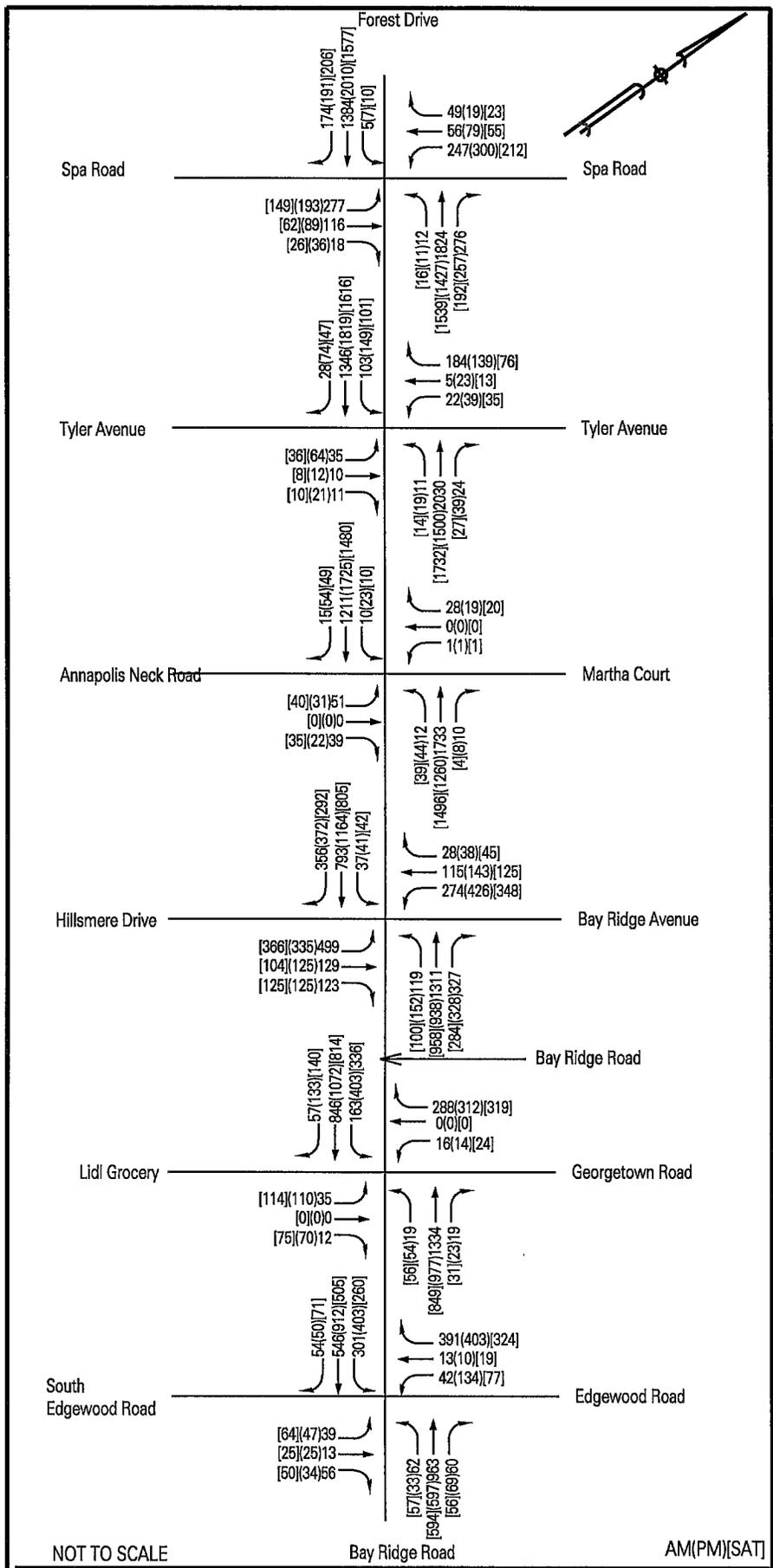
NOT TO SCALE

Bay Ridge Road

AM(PM)[SAT]

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EXHIBIT 6
 Background Traffic Volumes



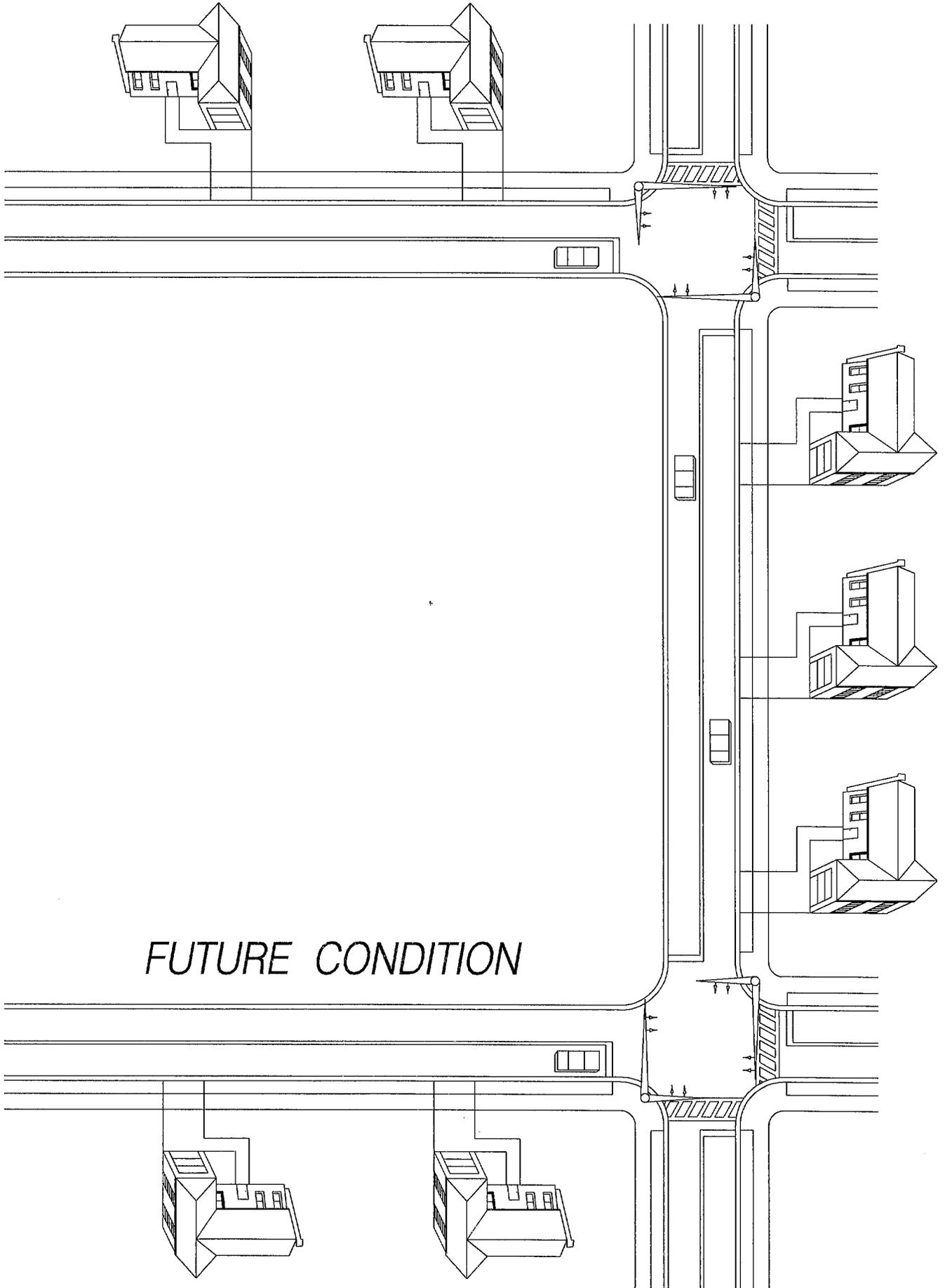
NOT TO SCALE

Bay Ridge Road

AM(PM)(SAT)

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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	
	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>	<u>IN</u>	<u>OUT</u>
Chesapeake Grove						
<u>ITE Land Use Code 230</u>						
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

	<u>AM</u> <u>Delay(LOS)</u>	<u>PM</u> <u>Delay(LOS)</u>	<u>SAT</u> <u>Delay(LOS)</u>
<u>Forest Drive @ Spa Road</u>			
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)
<u>Forest Drive @ Tyler Avenue</u>			
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)
<u>Forest Drive @ Annapolis Neck Road</u>			
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)
<u>Forest Drive @ Bay Ridge Avenue/ Hillsmere Drive</u>			
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)
<u>Bay Ridge Road @ Georgetown Road</u>			
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)
<u>Bay Ridge Road @ Edgewood Road</u>			
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 95 th Queue (SIMTRAFFIC)		PM PEAK Projected 95 th Queue (SIMTRAFFIC)		SAT PEAK Projected 95 th 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:

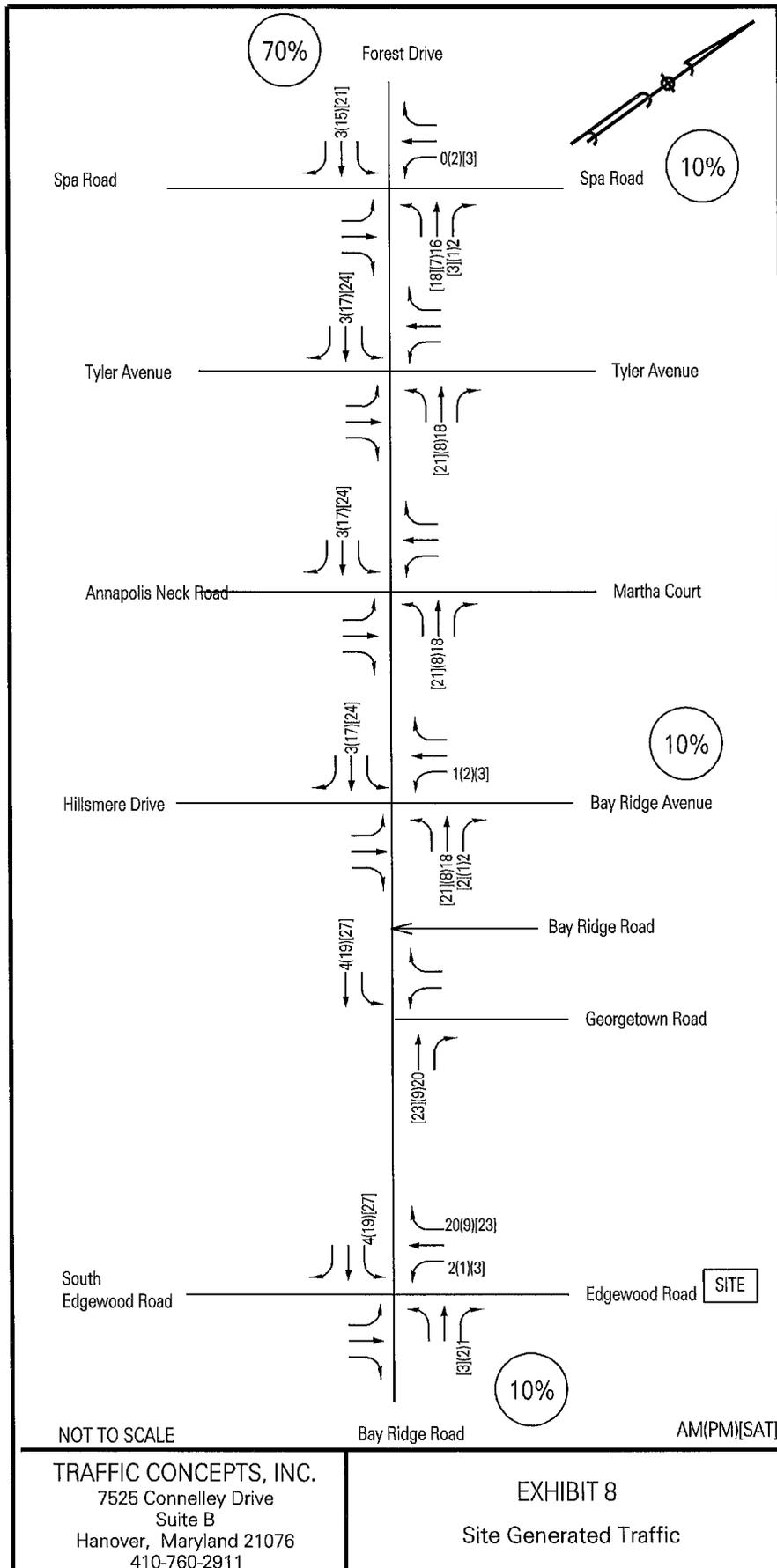
	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	7.14	0.00	1.00	321
7-9 AM Peak Hour Enter	0.10	0.00	1.00	5
7-9 AM Peak Hour Exit	0.50	0.00	1.00	22
7-9 AM Peak Hour Total	0.61	0.00	1.00	27
4-6 PM Peak Hour Enter	0.47	0.00	1.00	21
4-6 PM Peak Hour Exit	0.23	0.00	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

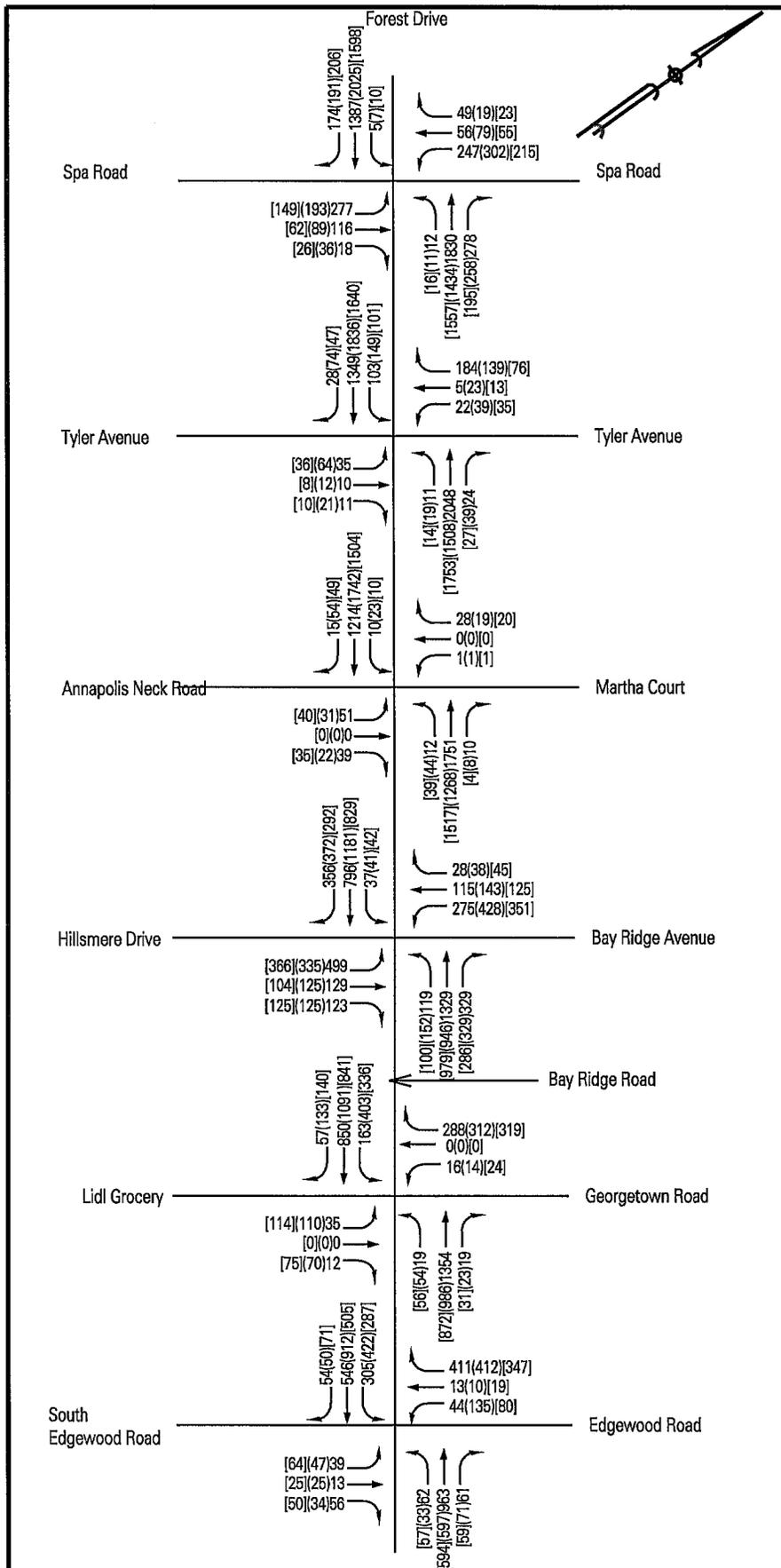
The above rates were calculated from these equations:

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

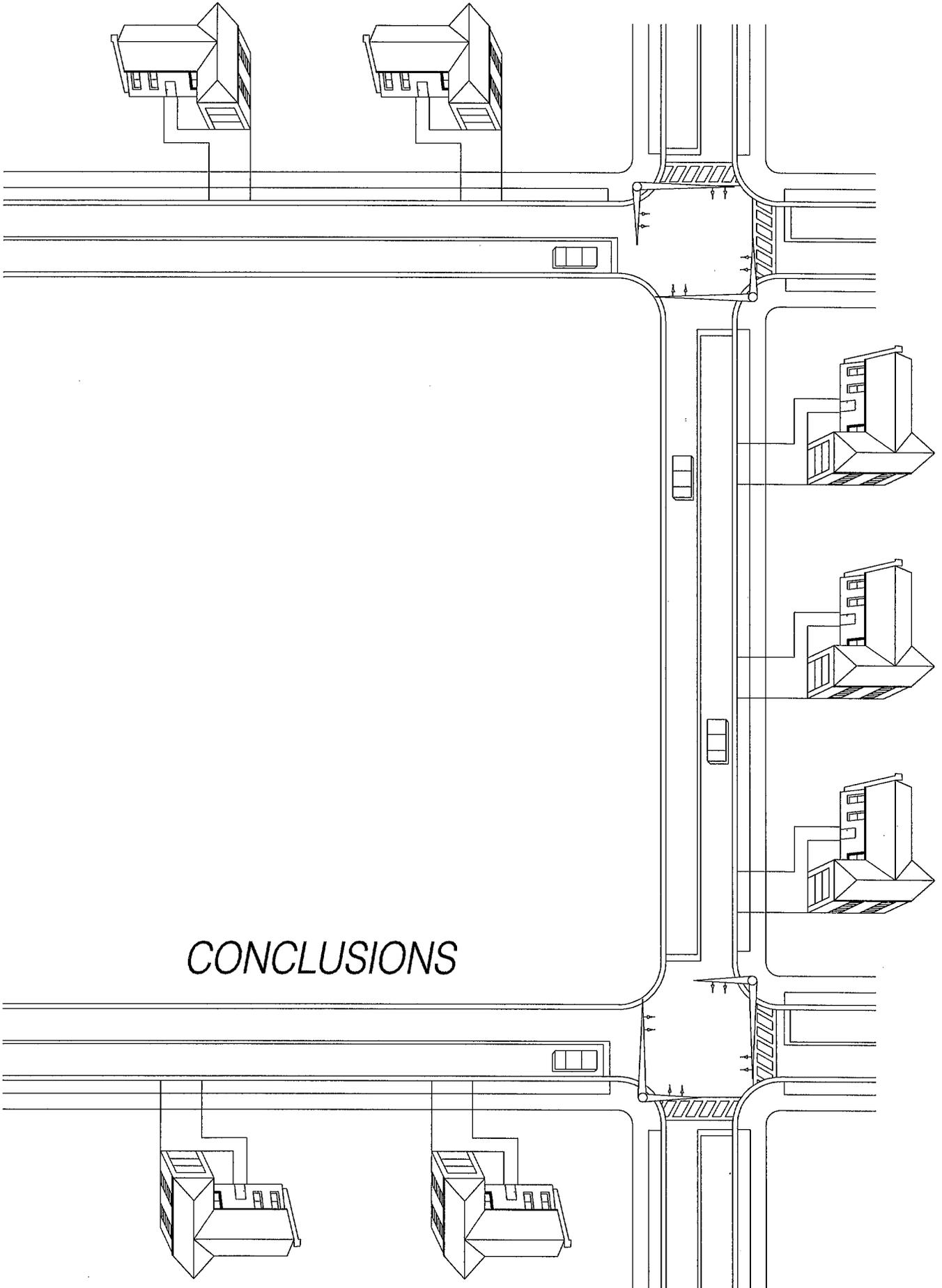
TRIP GENERATION 2013, TRAFFICWARE, LLC





TRAFFIC CONCEPTS, INC.
 7525 Connolley Drive
 Suite B
 Hanover, Maryland 21076
 410-760-2911

EXHIBIT 9
 Total Future Traffic Volumes



CONCLUSIONS

CONCLUSIONS

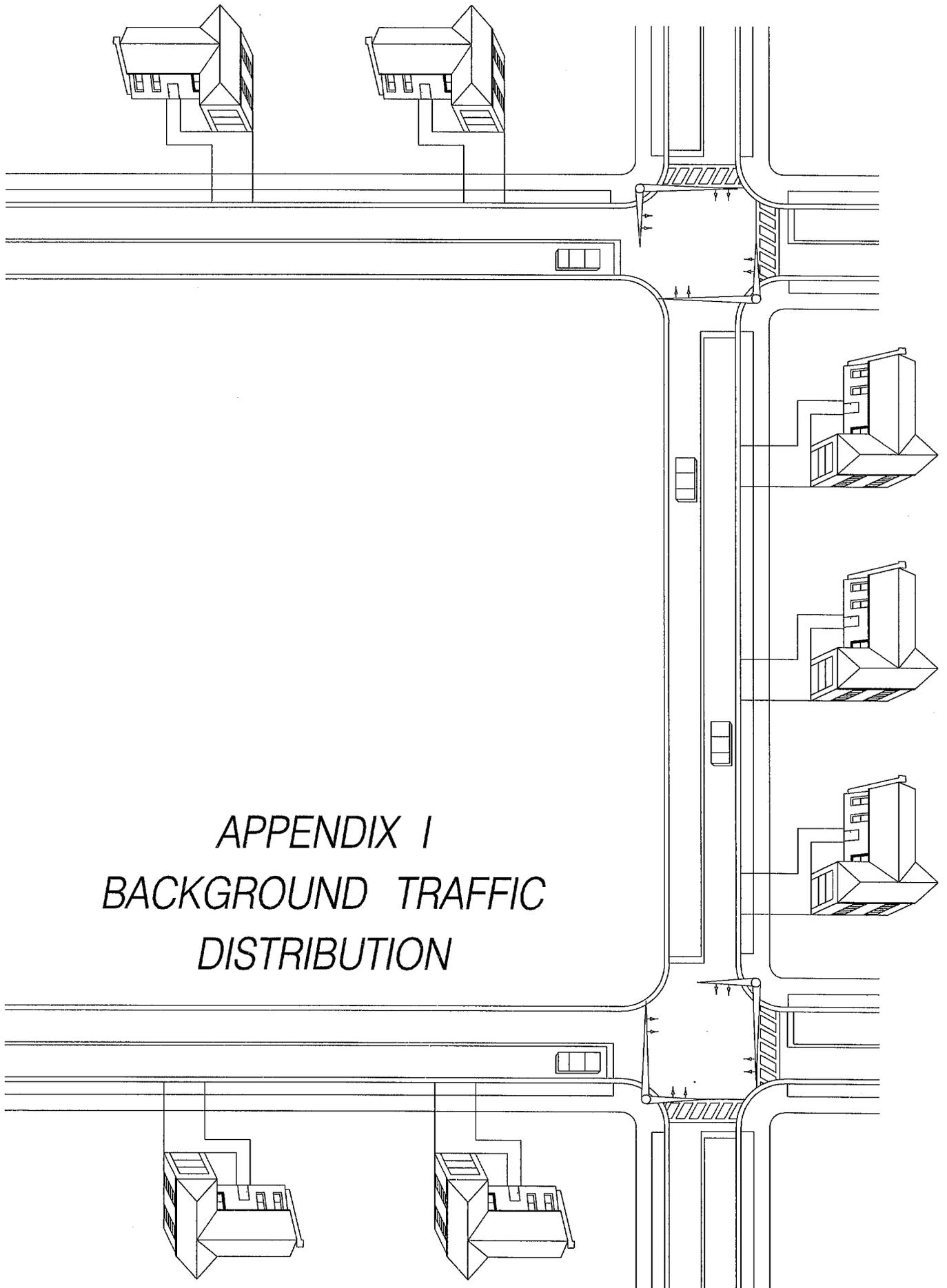
The traffic impact study indicates that from a SYNCHRO analysis standpoint, all intersections will operate at acceptable overall levels of service as dictated by the City of Annapolis Traffic Impact Study Guidelines, with the following exception:

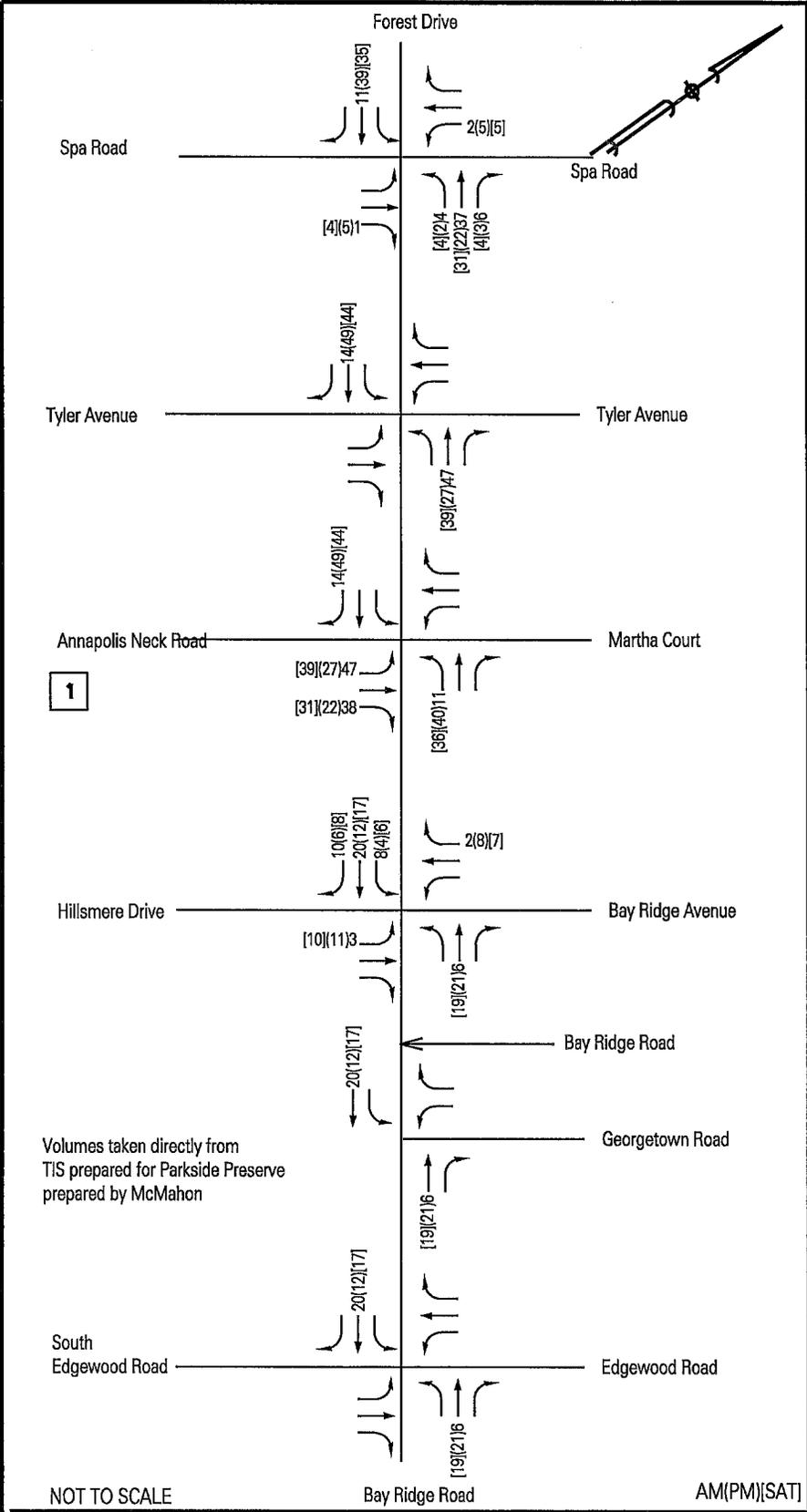
The intersection of Forest Drive @ Spa Road is projected to operate at an overall "E" level of service (60.5 seconds per vehicle of overall delay) during the weekday evening peak period. With minor timing changes, this intersection could be improved to an acceptable "D" level of service. By transferring 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.

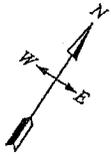
*APPENDIX I
BACKGROUND TRAFFIC
DISTRIBUTION*



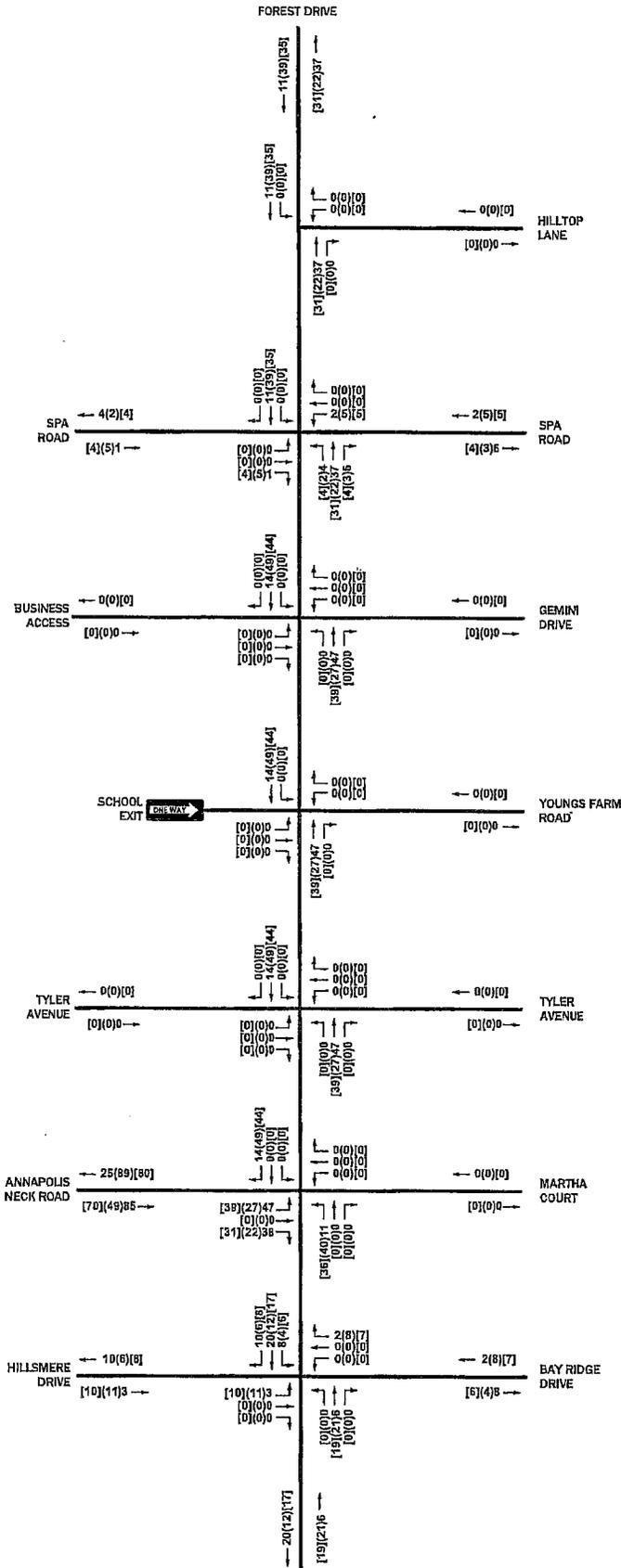


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BACKGROUND 1
Parkside Preserve



Schematic
Not To
Scale



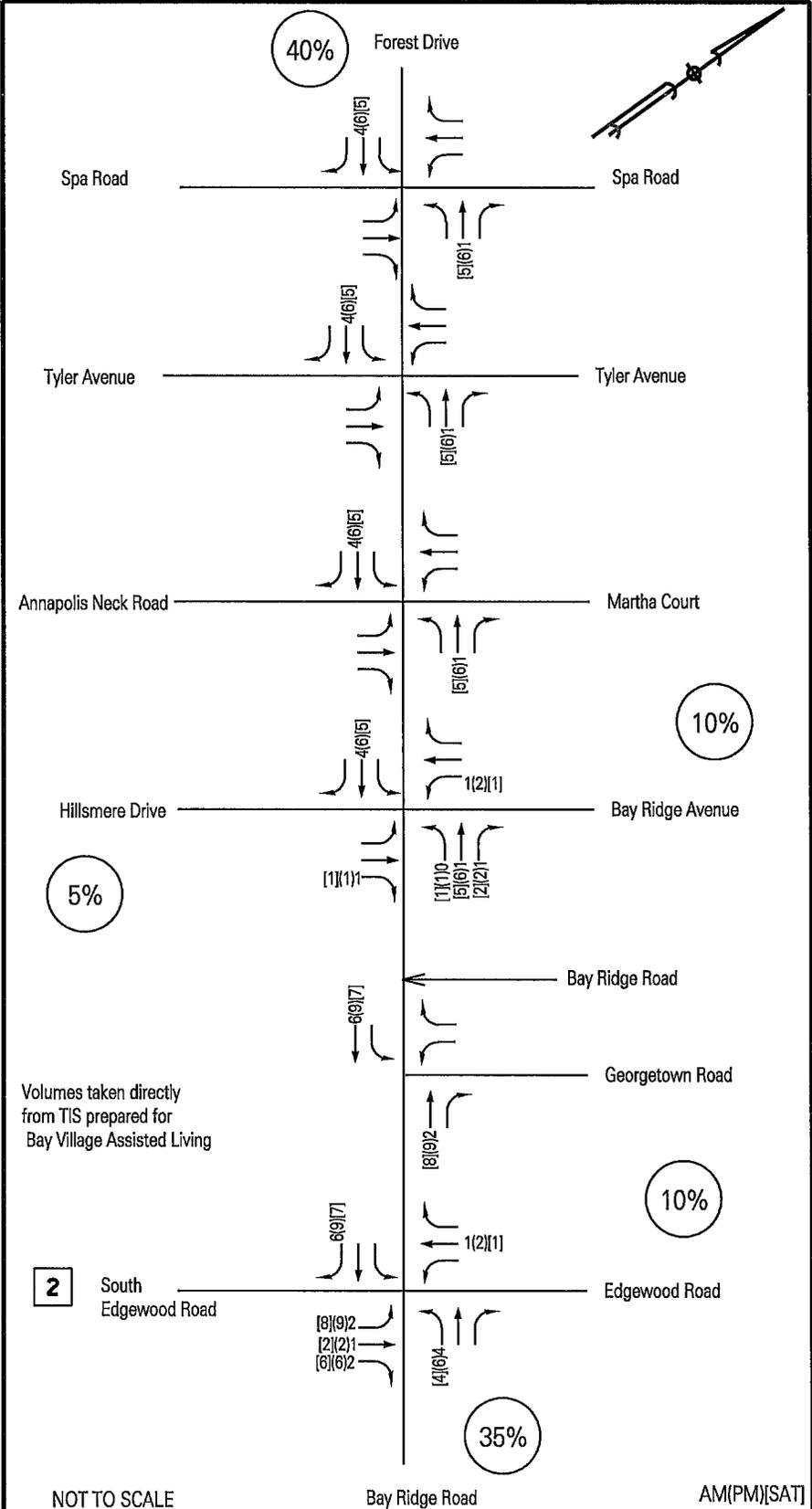
SITE

	AM	(PM)	[SAT]
IN	25	89	80
OUT	85	49	70

FIGURE 8
"New" Trip Assignment
QUIET WATERS PRESERVE
CITY OF ANNAPOLIS, MARYLAND



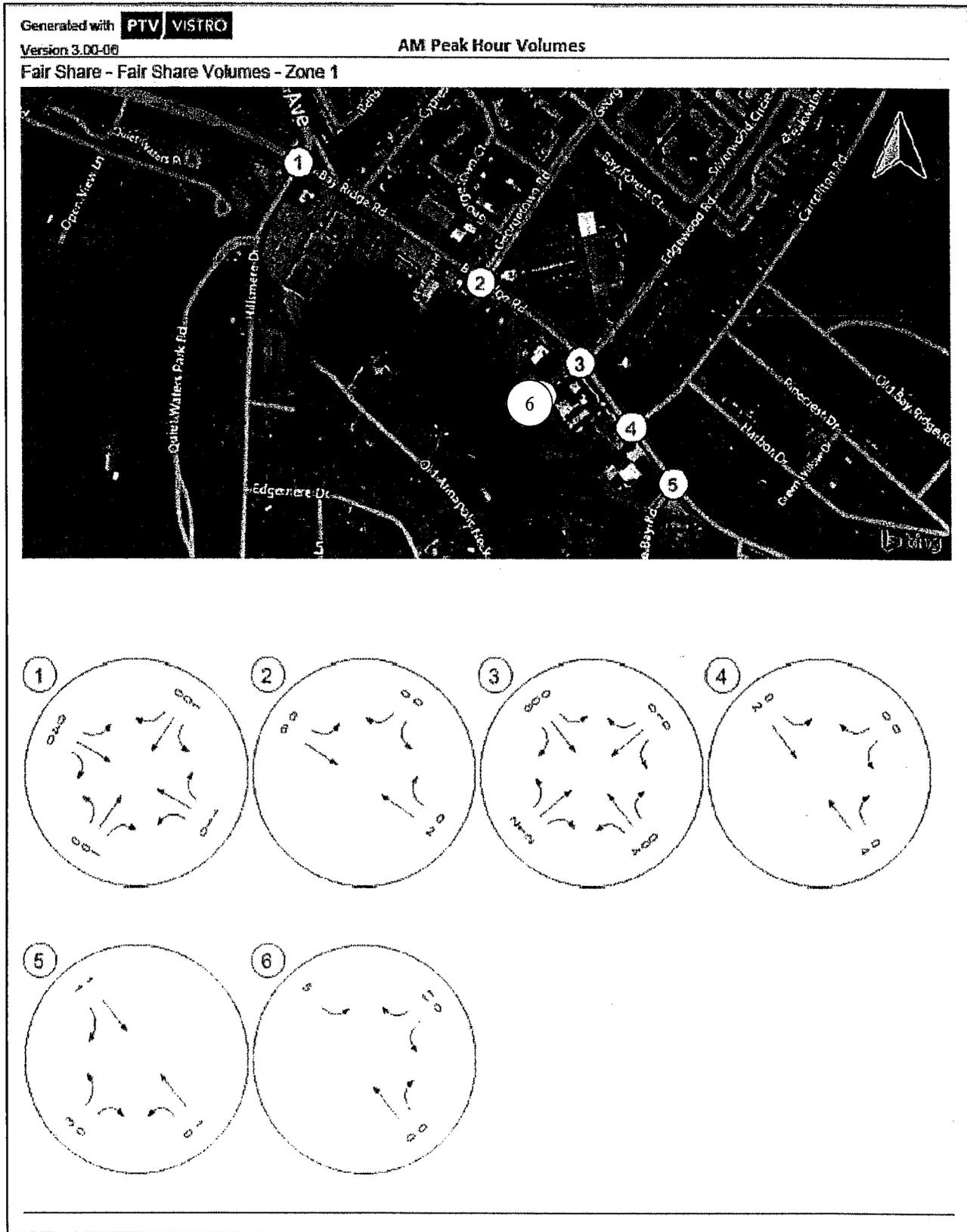
(3/16/11-LBK) I:\Eng\10616\Dwg\Figures\Figure8.dwg



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BACKGROUND 2
 Bay Village Assisted Living

Traffic Impact Analysis for the Bay Village Assisted Living Development



Traffic Impact Analysis for the Bay Village Assisted Living Development

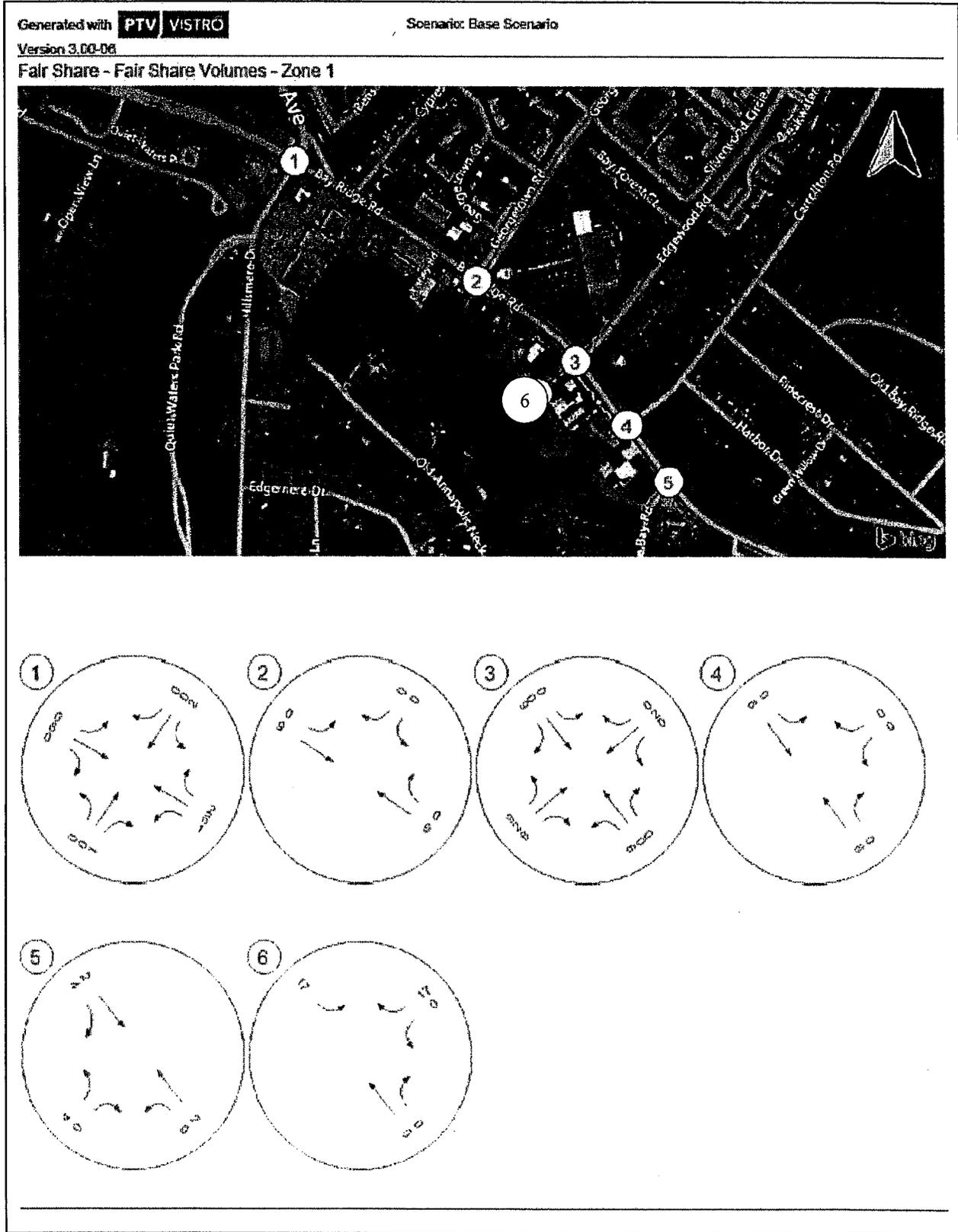


Figure 12: Proposed Site Net New PM Peak Hour Generated Site Trips

Traffic Impact Analysis for the Bay Village Assisted Living Development

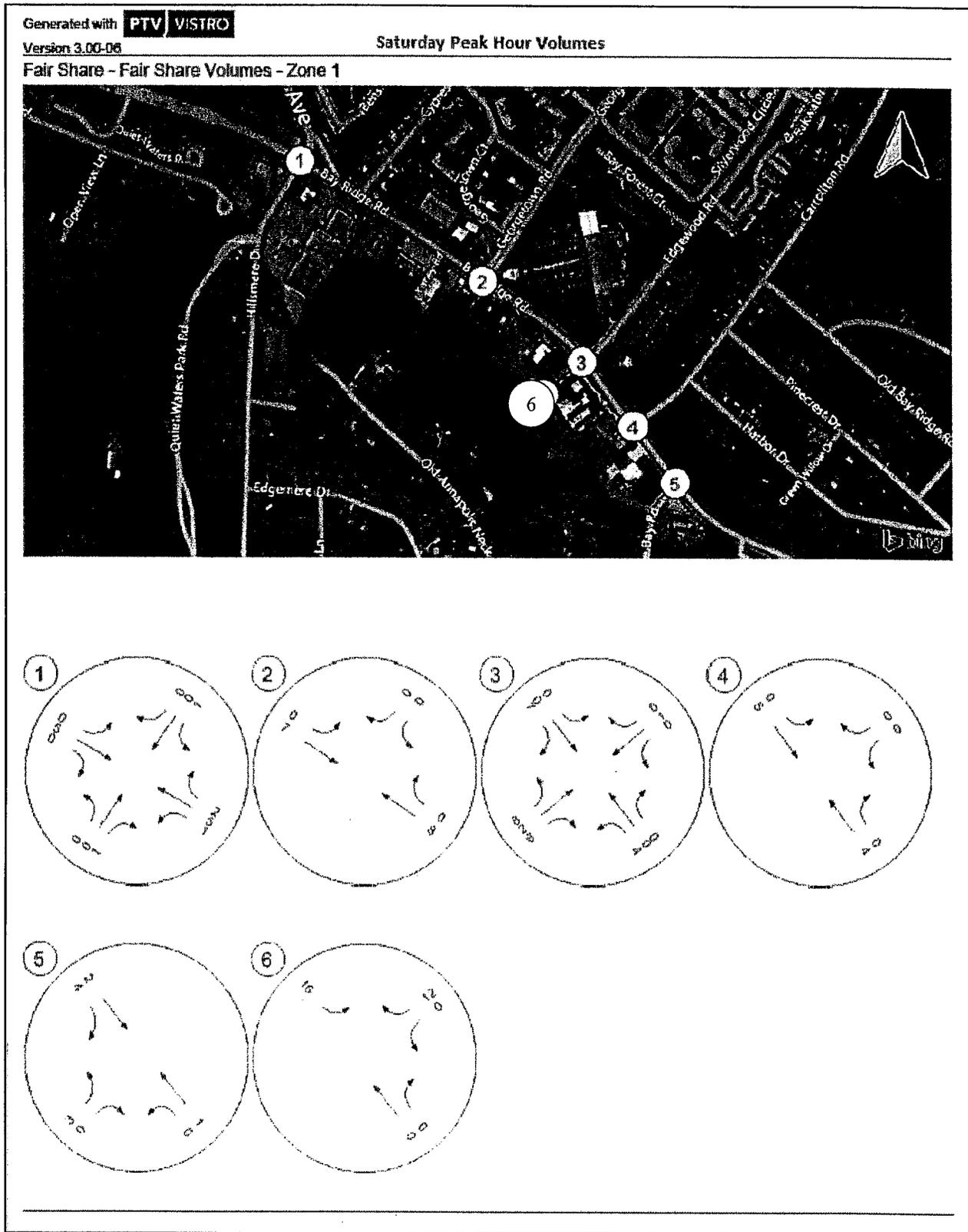
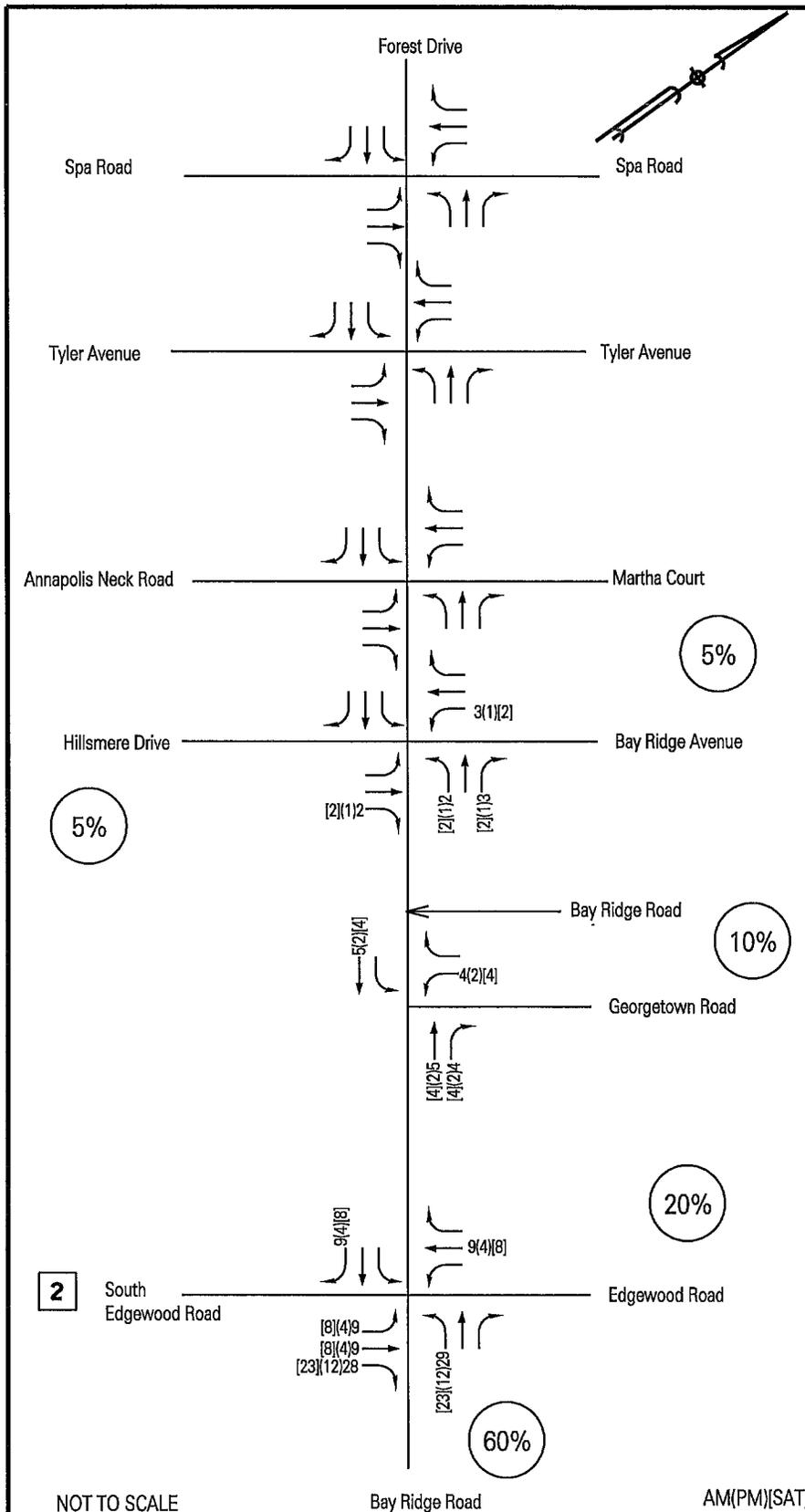
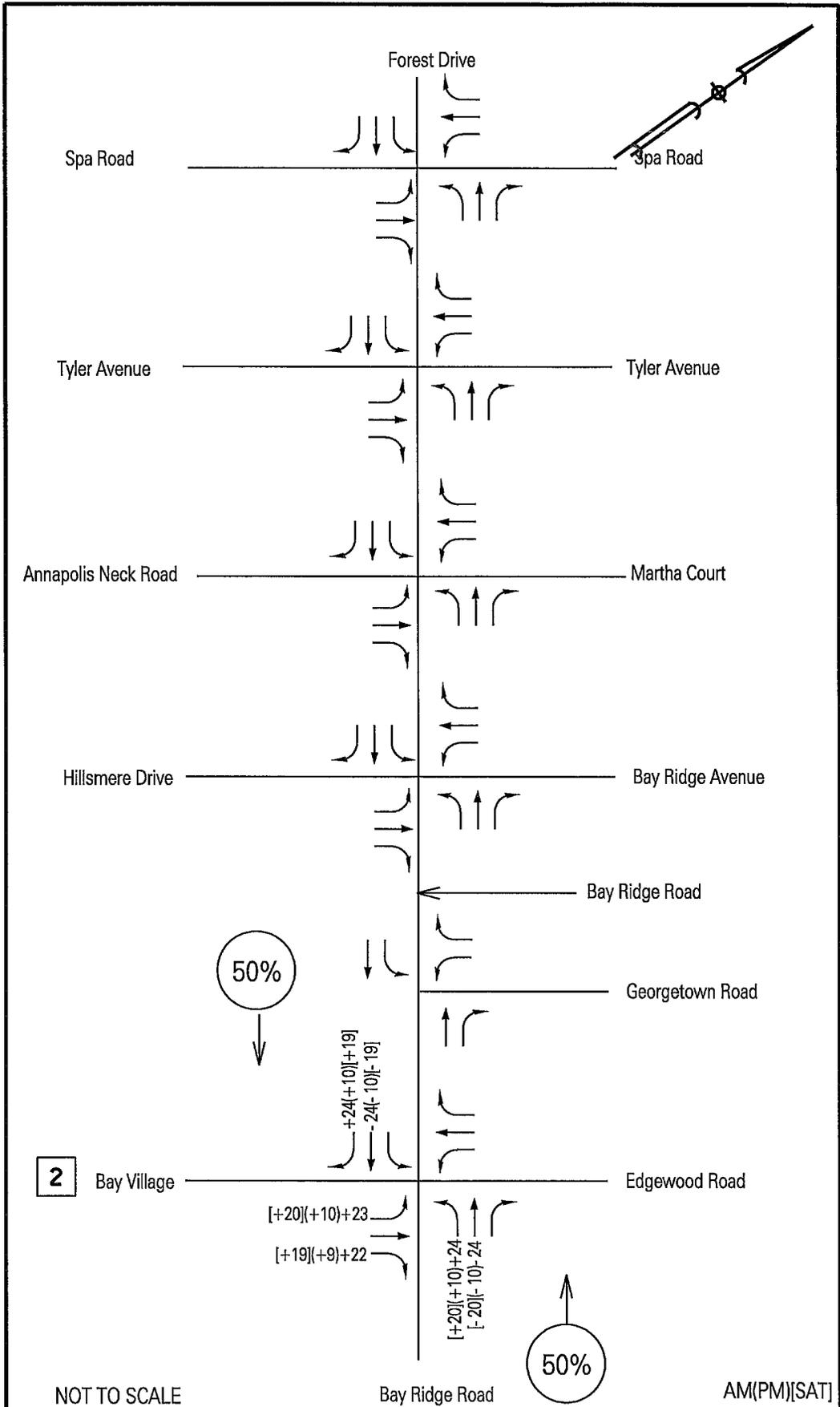


Figure 13: Proposed Site Net New Saturday Peak Hour Generated Site Trips



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BACKGROUND 2
 Bay Village - Starbucks



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BACKGROUND 2
 Bay Village
 Starbucks - Passby Trips

Detailed Average Rate Trip Calculations
 For 1.850 Th.Sq.Ft. GFA of Coffee/Donut Shop with Drive-Thru(937) - [R]

Project: Starbucks
 Phase:

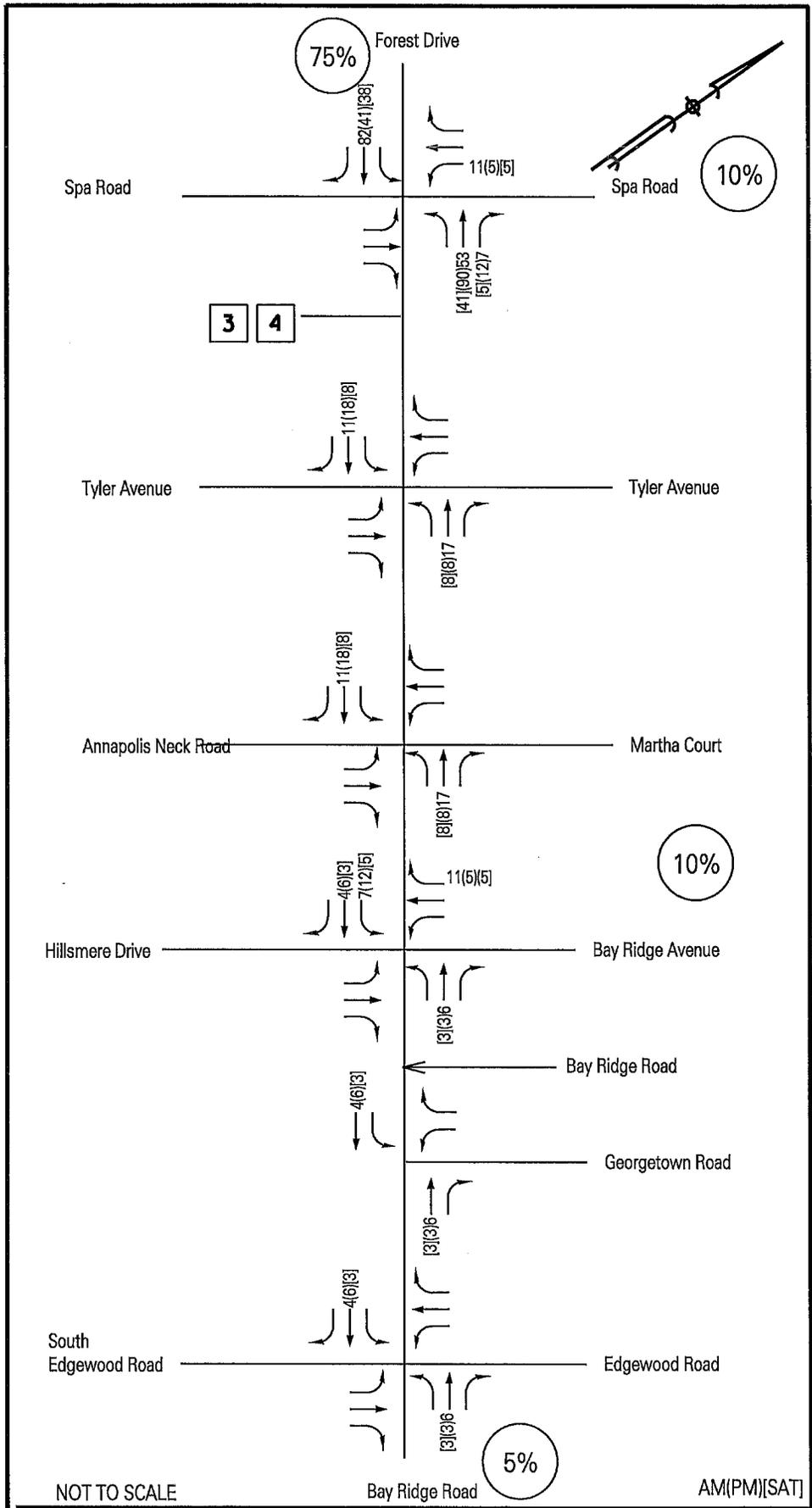
Open Date:
 Analysis Date:

Description:

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	818.58	0.00	1.00	1514
7-9 AM Peak Hour Enter	51.30	0.00	1.00	95
7-9 AM Peak Hour Exit	49.28	0.00	1.00	91
7-9 AM Peak Hour Total	100.58	49.38	1.00	186
4-6 PM Peak Hour Enter	21.40	0.00	1.00	40
4-6 PM Peak Hour Exit	21.40	0.00	1.00	39
4-6 PM Peak Hour Total	42.80	18.06	1.00	79
AM Pk Hr, Generator, Enter	49.69	0.00	1.00	92
AM Pk Hr, Generator, Exit	51.71	0.00	1.00	96
AM Pk Hr, Generator, Total	101.40	45.90	1.00	188
PM Pk Hr, Generator, Enter	18.44	0.00	1.00	34
PM Pk Hr, Generator, Exit	17.72	0.00	1.00	33
PM Pk Hr, Generator, Total	36.16	19.50	1.00	67
Saturday 2-Way Volume	0.00	0.00	1.00	0
Saturday Peak Hour Enter	42.26	0.00	1.00	78
Saturday Peak Hour Exit	42.26	0.00	1.00	78
Saturday Peak Hour Total	84.52	33.38	1.00	156
Sunday 2-Way Volume	0.00	0.00	1.00	0
Sunday Peak Hour Enter	0.00	0.00	1.00	0
Sunday Peak Hour Exit	0.00	0.00	1.00	0
Sunday Peak Hour Total	0.00	0.00	1.00	0

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

TRIP GENERATION 2013, TRAFFICWARE, LLC



NOT TO SCALE

Bay Ridge Road

AM(PM)[SAT]

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

BACKGROUNDS 3 & 4
 1503 Forest Drive & 1415 Forest Drive

Detailed Average Rate Trip Calculations
 For 2.986 Th.Sq.Ft. GFA of Specialty Retail Center(826) - [R]

Project: 1415 Forest Drive
 Phase:

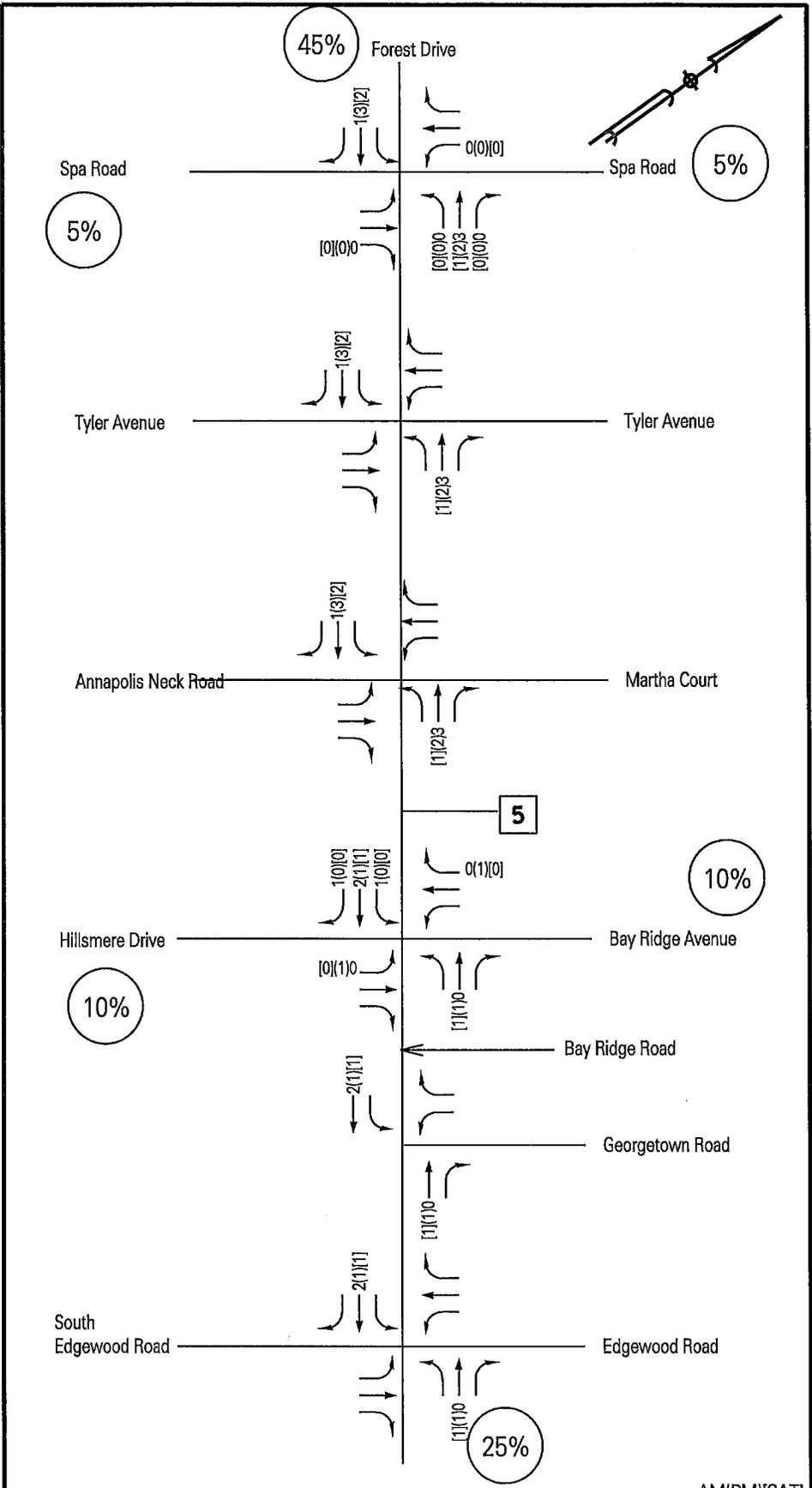
Open Date:
 Analysis Date:

Description:

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	44.32	15.52	1.00	132
7-9 AM Peak Hour Enter	0.00	0.00	1.00	0
7-9 AM Peak Hour Exit	0.00	0.00	1.00	0
7-9 AM Peak Hour Total	0.00	0.00	1.00	0
4-6 PM Peak Hour Enter	1.19	0.00	1.00	4
4-6 PM Peak Hour Exit	1.52	0.00	1.00	4
4-6 PM Peak Hour Total	2.71	1.83	1.00	8
AM Pk Hr, Generator, Enter	3.28	0.00	1.00	10
AM Pk Hr, Generator, Exit	3.56	0.00	1.00	10
AM Pk Hr, Generator, Total	6.84	3.55	1.00	20
PM Pk Hr, Generator, Enter	2.81	0.00	1.00	8
PM Pk Hr, Generator, Exit	2.21	0.00	1.00	7
PM Pk Hr, Generator, Total	5.02	2.31	1.00	15
Saturday 2-Way Volume	42.04	13.97	1.00	126
Saturday Peak Hour Enter	0.00	0.00	1.00	0
Saturday Peak Hour Exit	0.00	0.00	1.00	0
Saturday Peak Hour Total	0.00	0.00	1.00	0
Sunday 2-Way Volume	20.43	10.27	1.00	61
Sunday Peak Hour Enter	0.00	0.00	1.00	0
Sunday Peak Hour Exit	0.00	0.00	1.00	0
Sunday Peak Hour Total	0.00	0.00	1.00	0

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

TRIP GENERATION 2013, TRAFFICWARE, LLC



NOT TO SCALE

Bay Ridge Road

AM(PM)[SAT]

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

BACKGROUND 5
 Thomas Woods

Detailed Average Rate Trip Calculations
 For 10 Dwelling Units of Residential Condominium / Townhouse(230) - [E]

Project: Thomas Woods
 Phase:

Open Date:
 Analysis Date:

Description:

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	8.68	0.00	1.00	87
7-9 AM Peak Hour Enter	0.14	0.00	1.00	1
7-9 AM Peak Hour Exit	0.68	0.00	1.00	7
7-9 AM Peak Hour Total	0.82	0.00	1.00	8
4-6 PM Peak Hour Enter	0.61	0.00	1.00	6
4-6 PM Peak Hour Exit	0.30	0.00	1.00	3
4-6 PM Peak Hour Total	0.91	0.00	1.00	9
AM Pk Hr, Generator, Enter	0.15	0.00	1.00	1
AM Pk Hr, Generator, Exit	0.62	0.00	1.00	7
AM Pk Hr, Generator, Total	0.77	0.00	1.00	8
PM Pk Hr, Generator, Enter	2.51	0.00	1.00	25
PM Pk Hr, Generator, Exit	1.41	0.00	1.00	14
PM Pk Hr, Generator, Total	3.93	0.00	1.00	39
Saturday 2-Way Volume	46.41	0.00	1.00	464
Saturday Peak Hour Enter	2.46	0.00	1.00	25
Saturday Peak Hour Exit	2.09	0.00	1.00	21
Saturday Peak Hour Total	4.55	0.00	1.00	46
Sunday 2-Way Volume	38.86	0.00	1.00	389
Sunday Peak Hour Enter	2.56	0.00	1.00	26
Sunday Peak Hour Exit	2.67	0.00	1.00	26
Sunday Peak Hour Total	5.23	0.00	1.00	52

} Weekday
rates

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

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

Detailed Average Rate Trip Calculations
 For 10 Dwelling Units of Residential Condominium / Townhouse(230) - [R]

Project: Thomas Woods
 Phase:

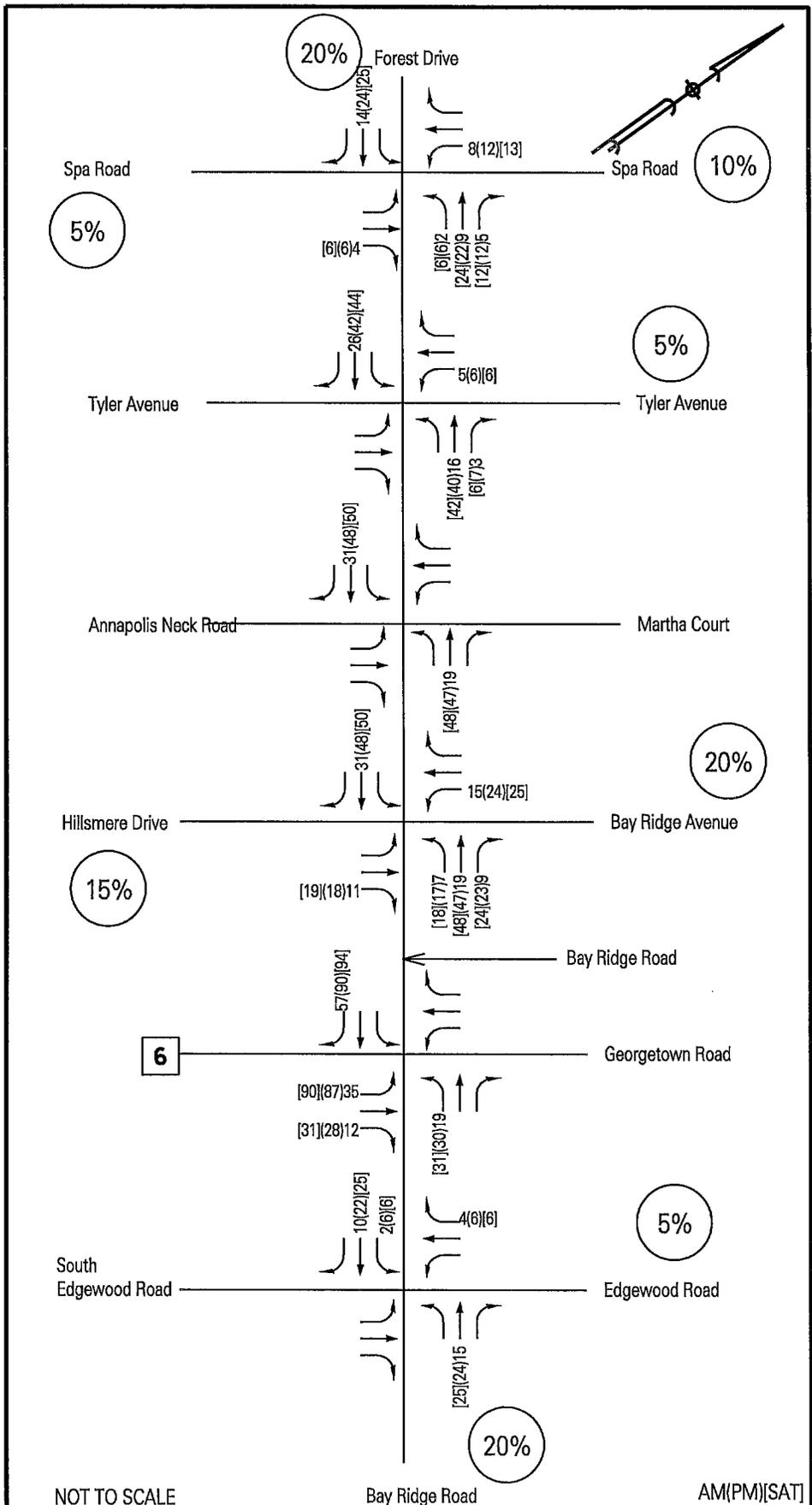
Open Date:
 Analysis Date:

Description:

	Average Rate	Standard Deviation	Adjustment Factor	Driveway Volume
Avg. Weekday 2-Way Volume	5.81	3.11	1.00	58
7-9 AM Peak Hour Enter	0.07	0.00	1.00	1
7-9 AM Peak Hour Exit	0.37	0.00	1.00	3
7-9 AM Peak Hour Total	0.44	0.69	1.00	4
4-6 PM Peak Hour Enter	0.35	0.00	1.00	4
4-6 PM Peak Hour Exit	0.17	0.00	1.00	1
4-6 PM Peak Hour Total	0.52	0.75	1.00	5
AM Pk Hr, Generator, Enter	0.08	0.00	1.00	1
AM Pk Hr, Generator, Exit	0.36	0.00	1.00	3
AM Pk Hr, Generator, Total	0.44	0.68	1.00	4
PM Pk Hr, Generator, Enter	0.33	0.00	1.00	3
PM Pk Hr, Generator, Exit	0.19	0.00	1.00	2
PM Pk Hr, Generator, Total	0.52	0.75	1.00	5
Saturday 2-Way Volume	5.67	3.10	1.00	57
Saturday Peak Hour Enter	0.25	0.00	1.00	3
Saturday Peak Hour Exit	0.22	0.00	1.00	2
Saturday Peak Hour Total	0.47	0.71	1.00	5
Sunday 2-Way Volume	4.84	2.71	1.00	48
Sunday Peak Hour Enter	0.22	0.00	1.00	2
Sunday Peak Hour Exit	0.23	0.00	1.00	3
Sunday Peak Hour Total	0.45	0.70	1.00	5

} Saturday rates

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



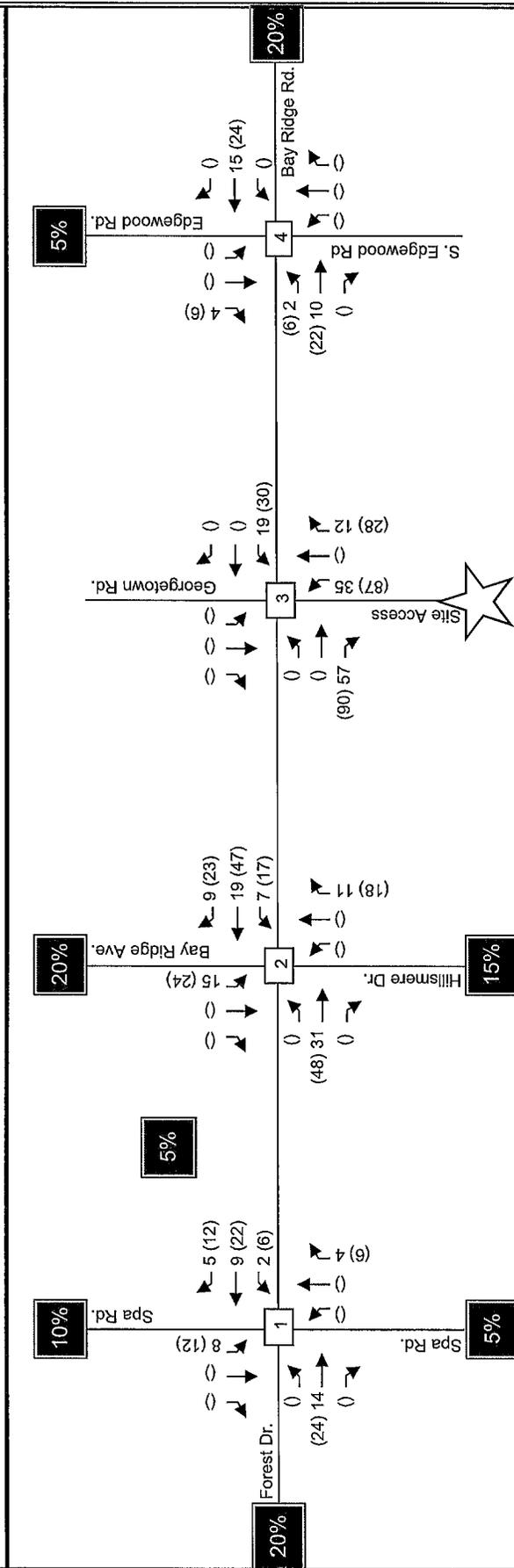
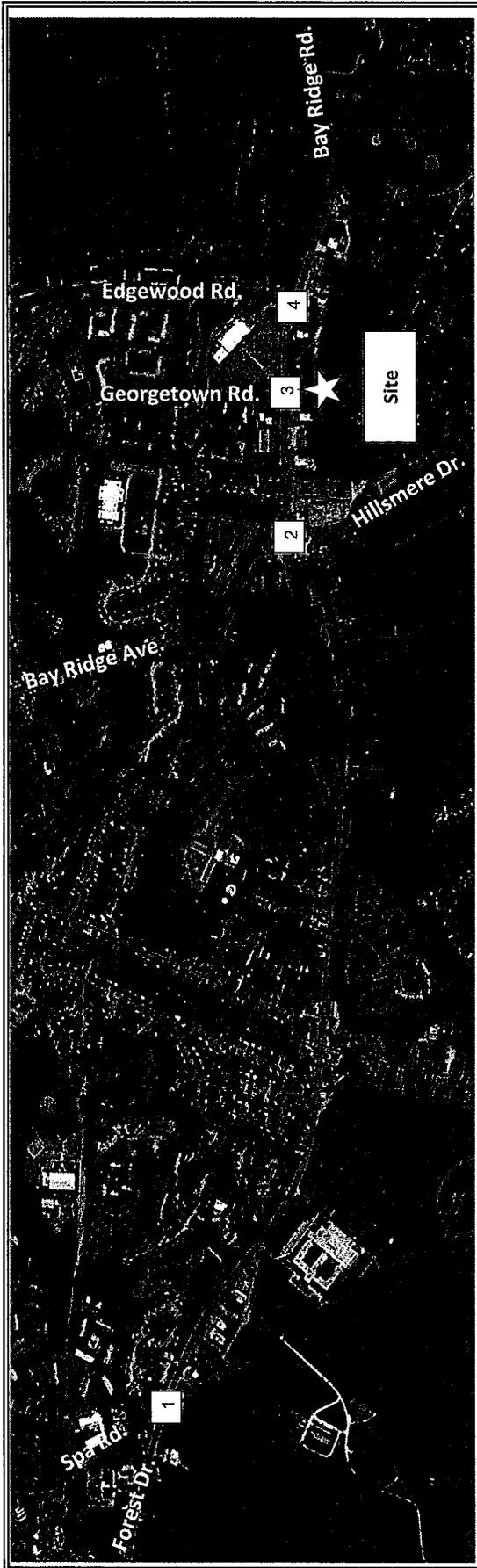
NOT TO SCALE

Bay Ridge Road

AM(PM)[SAT]

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

BACKGROUND 6
 Lidl Grocery Store - New Trips



Primary Trip Assignment for Site

Exhibit 7a

Traffic Impact Analysis

LENHART TRAFFIC CONSULTING, INC.
 645 BALTIMORE ANNAPOLIS BLVD, SUITE 214
 SEVERNA PARK, MD 21146
 www.lenharttraffic.com

Trip Generation Rates

Supermarket (ksf, ITE-850) Trip Distribution (In/Out)

Morning Trips = 3.40 x ksf 62/38

Ln(Evening Trips) = 0.74 x Ln(ksf) + 3.25 51/49

Trip Generation Totals

	36,170 sq.ft.	AM Peak		Total	PM Peak		Total
		In	Out		In	Out	
Supermarket (ksf, ITE-850)		76	47	123	187	180	367
Passby Trips per ITE Table 5.10 (0% AM & 36% PM)		0	0	0	-67	-65	-132
Total Primary (Off-site) Trips:		76	47	123	120	115	235

NOTES: Trip Generation Rates obtained from the ITE Trip Generation Manual, 9th Edition
 Pass-by Rates obtained from the ITE Trip Generation Manual, 9th Edition (Table 5.10)

Traffic Impact Analysis	Trip Generation for Site
Exhibit 6	

LENHART TRAFFIC CONSULTING, INC.
 645 BALTIMORE ANNAPOLIS BLVD, SUITE 214
 SEVERNA PARK, MD 21146
 www.lenharttraffic.com

Trip Generation Summary
Saturday Peak Hour of Generator

Alternative: Alternative 1

Phase:

Open Date: 4/6/2017

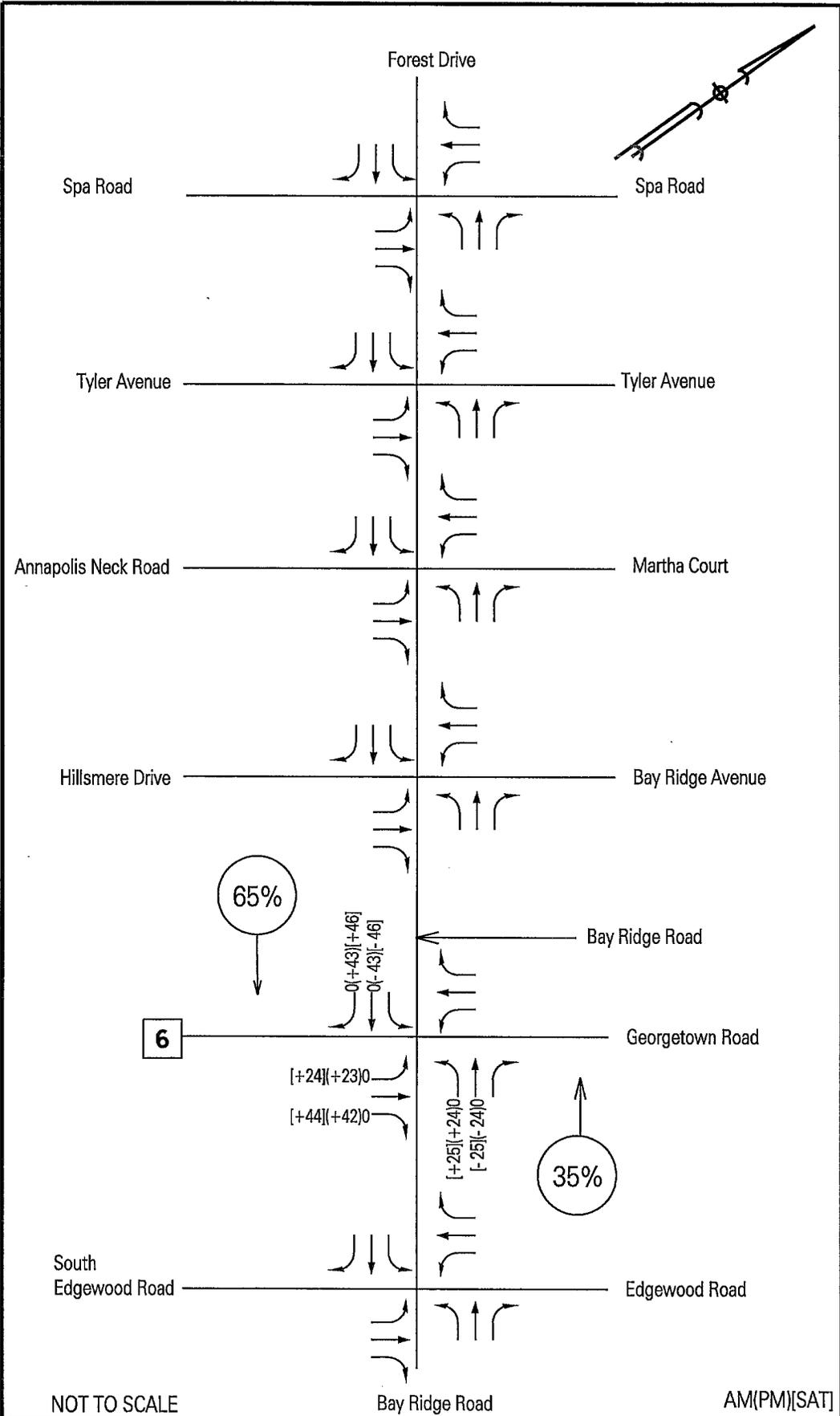
Project: Lidl Grocery Store

Analysis Date: 4/6/2017

ITE	Land Use	Size	Units	*	Enter	Exit	Total
850	SUPERMARKET 1	36.17	Gross Floor Area 1000 SF		196	189	385
Unadjusted Volume					196	189	385
Internal Capture Trips					0	0	0
Pass-By Trips					0	0	0
Volume Added to Adjacent Streets					196	189	385

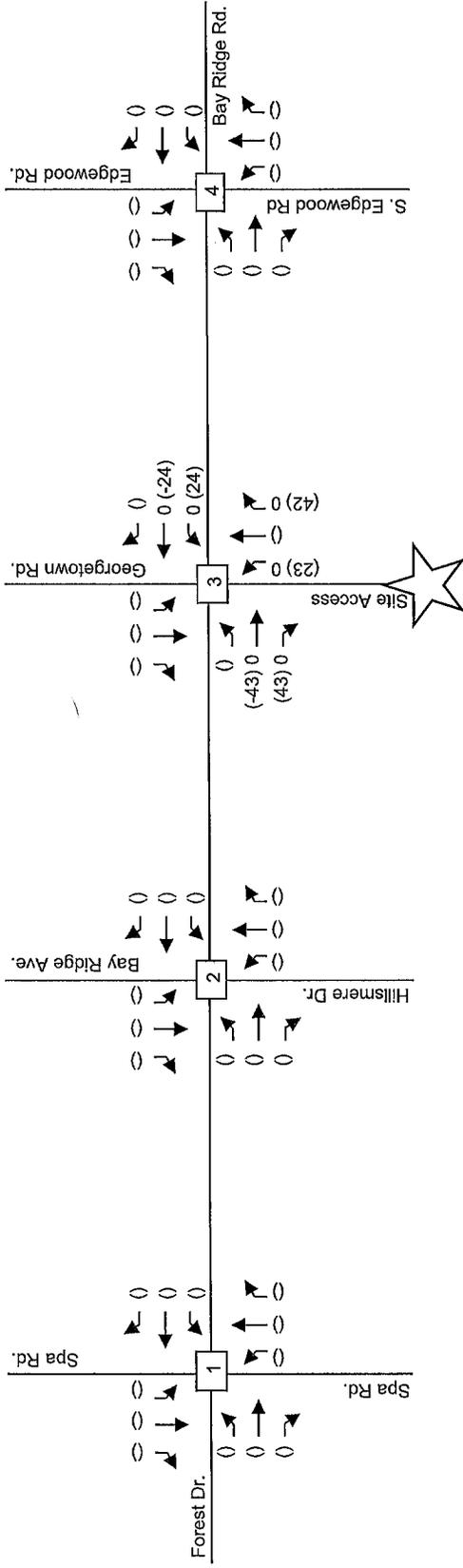
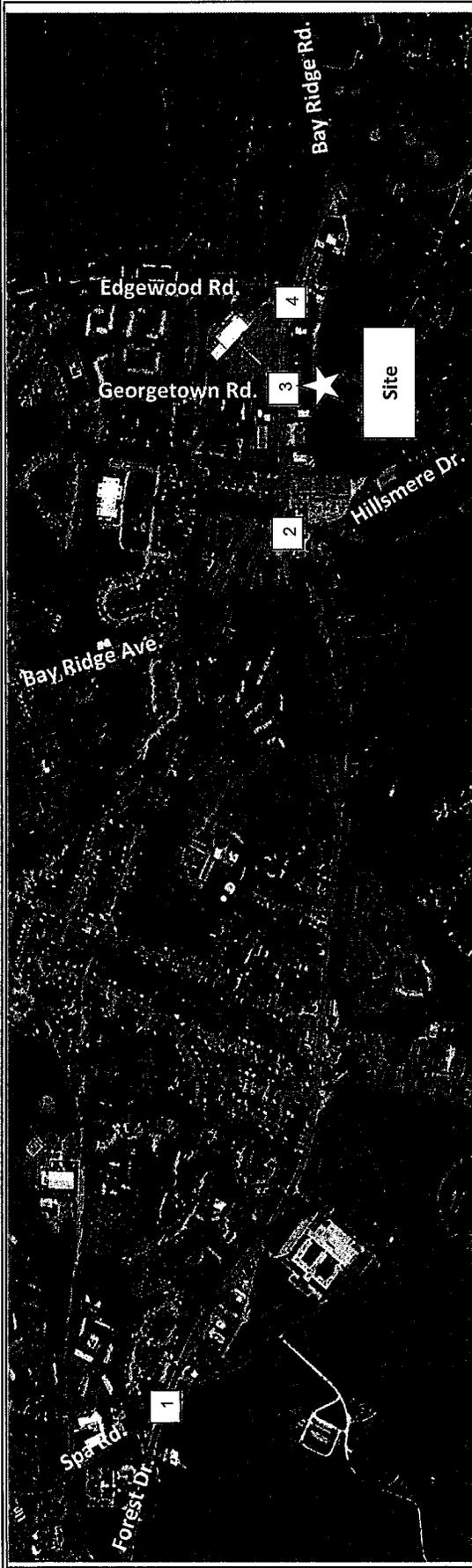
Total Saturday Peak Hour of Generator Internal Capture = 0 Percent

* - Custom rate used for selected time period.



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 7525 Connelley Drive
 Suite B
 Hanover, Maryland 21076
 410-760-2911

BACKGROUND 6
 Lidl Grocery Store - Passby Trips

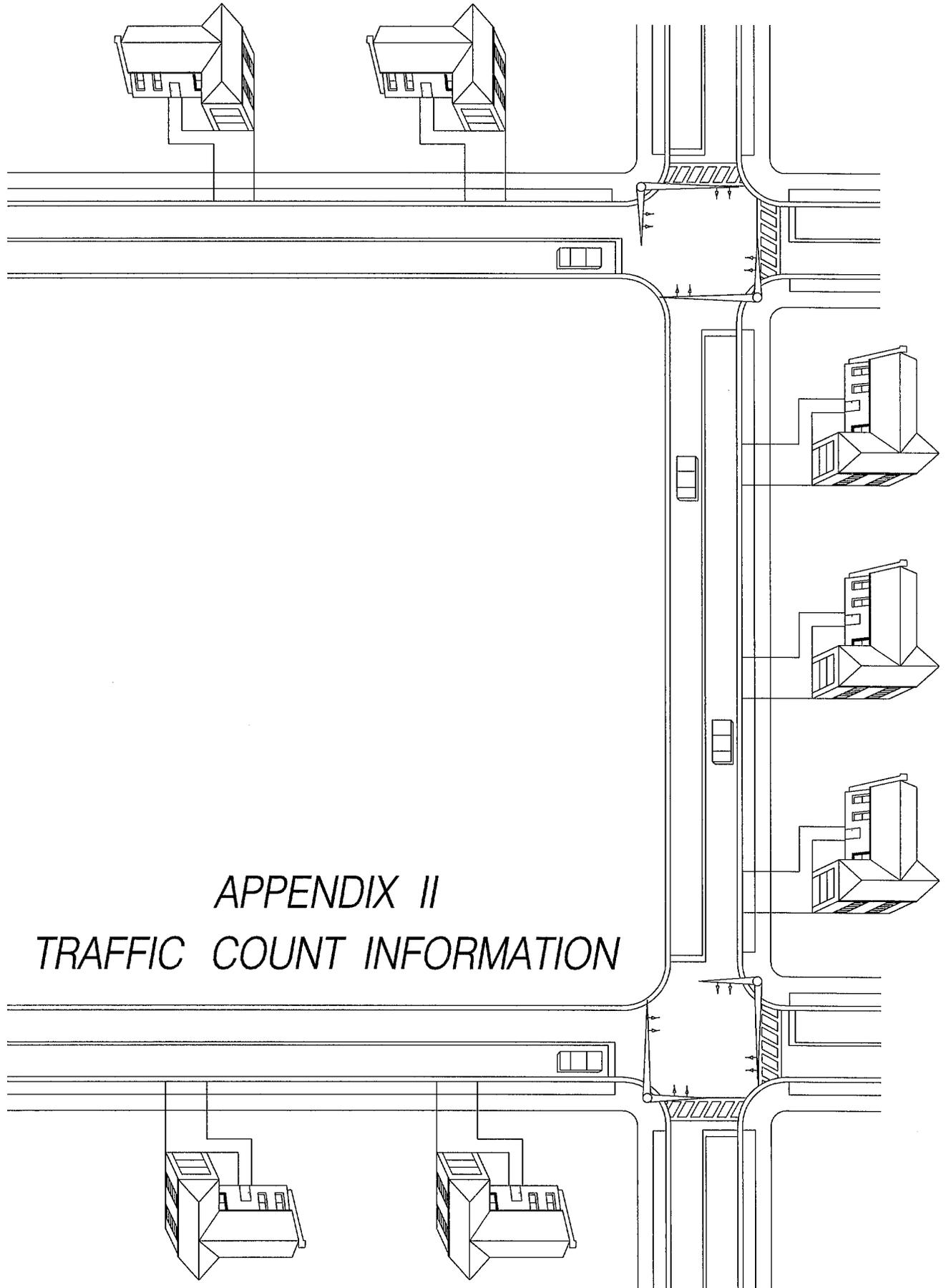


Traffic Impact Analysis

LENHART TRAFFIC CONSULTING, INC.
 645 BALTIMORE ANNAPOLIS BLVD, SUITE 214
 SEVERNA PARK, MD 21146
 www.lenharttraffic.com

Pass-by Trip Assignment for Site

Exhibit 7b



APPENDIX II
TRAFFIC COUNT INFORMATION

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DR @ SPA RD

CITY: ANNAPOLIS

COUNT BY: A. NEUSE / B. PAGE

DATE: MARCH 1, 2017

WEATHER: OVERCAST

DAY: WEDNESDAY

TIME	SPA RD NORTHBOUND			SPA RD SOUTHBOUND			FOREST DR EASTBOUND			FOREST DR WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
AM													
7:00-7:15	82	16	6	23	11	2	1	148	27	0	413	38	767
7:15-7:30	49	10	0	19	5	3	4	207	29	0	396	46	768
7:30-7:45	56	19	4	19	9	4	1	241	42	0	385	45	825
7:45-8:00	60	33	4	77	18	2	2	336	55	3	436	64	1090
8:00-8:15	87	36	3	56	13	11	1	346	58	1	366	62	1040
8:15-8:30	47	20	4	41	12	26	0	234	23	0	455	61	923
8:30-8:45	67	20	1	39	10	7	2	283	28	2	365	56	880
8:45-9:00	60	11	2	41	7	3	3	251	36	3	441	72	930
AM PEAK HR 7:45-8:45 TOTALS	261	109	12	213	53	46	5	1199	164	6	1622	243	PHF 0.90
PM													
4:00-4:15	40	17	3	57	12	4	1	376	43	0	348	50	951
4:15-4:30	46	14	6	47	12	6	3	413	50	0	320	56	973
4:30-4:45	38	16	2	82	13	5	4	389	38	0	319	47	953
4:45-5:00	42	17	7	60	20	5	2	429	48	1	269	47	947
5:00-5:15	61	25	3	76	22	3	0	435	46	0	322	66	1059
5:15-5:30	38	28	10	66	16	5	3	496	42	2	310	37	1053
5:30-5:45	41	14	4	60	16	5	2	428	44	0	310	67	991
5:45-6:00	34	15	9	59	14	4	3	432	59	0	260	42	931
PM PEAK HR 4:45-5:45 TOTALS	182	84	24	262	74	18	7	1788	180	3	1211	217	PHF 0.96

TRAFFIC CONCEPTS, INC.
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 HANOVER, MARYLAND 21076
 410 760 2911 (FAX) 410 760 2915
 E-MAIL TRAFFIC@TRAFFIC-CONCEPTS.COM

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DRIVE @ SPA ROAD

CITY: ANNAPOLIS

COUNT BY: A. NEUSE / B. PAGE

DATE: FEBRUARY 25, 2017

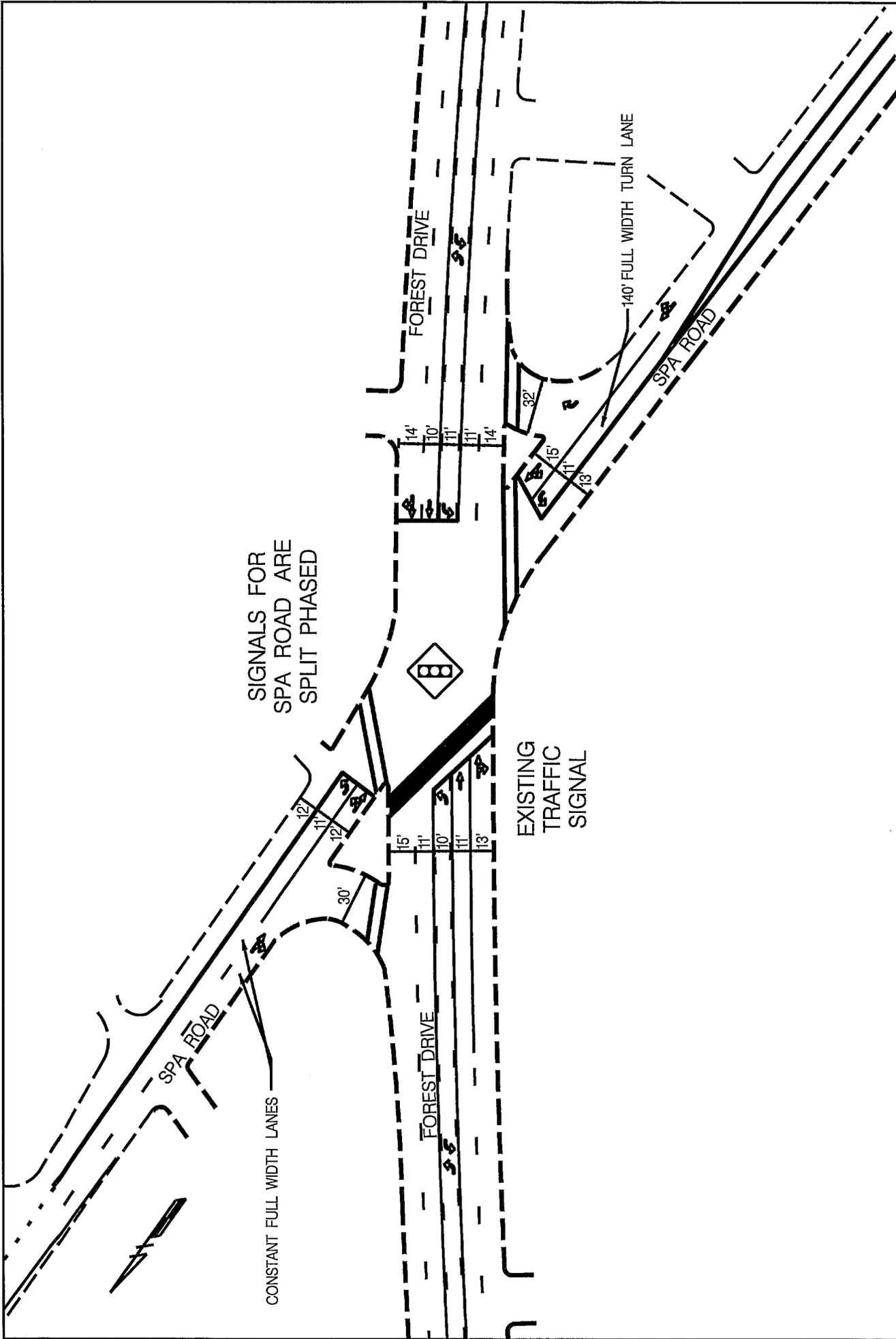
WEATHER: CLEAR

DAY: SATURDAY

TIME	SPA ROAD NORTHBOUND			SPA ROAD SOUTHBOUND			FOREST DRIVE EASTBOUND			FOREST DRIVE WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15	52	14	1	32	7	3	0	259	28	0	326	33	755
11:15-11:30	30	15	7	47	12	4	1	269	41	4	350	45	825
11:30-11:45	36	18	9	44	10	3	4	298	34	1	342	42	841
11:45-12:00	45	21	4	44	12	2	0	314	39	0	364	44	889
12:00-12:15	55	20	4	48	9	4	2	318	38	1	308	52	859
12:15-12:30	47	15	4	60	9	4	1	311	36	0	348	38	873
12:30-12:45	33	10	5	39	9	3	1	351	49	1	348	39	888
12:45-1:00	32	13	4	52	13	4	3	373	38	2	370	36	940
1:00-1:15	49	20	4	36	11	3	2	308	64	2	306	44	849
1:15-1:30	26	15	2	51	19	12	3	355	43	1	330	42	899
1:30-1:45	45	16	3	38	7	8	1	360	27	2	320	34	861
1:45-2:00	27	15	6	45	10	7	2	348	34	1	327	46	868
PEAK HR 12:30-1:30 TOTALS	140	58	15	178	52	22	9	1387	194	6	1354	161	PHF 0.95

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M:12690



DATE: MARCH, 2017 FILE # 2690
 EXISTING INTERSECTION CONFIGURATION
 FOREST DRIVE ROAD AND
 SPA ROAD
 ANNE ARUNDEL COUNTY, MARYLAND

SIGNALS FOR
 SPA ROAD ARE
 SPLIT PHASED

EXISTING
 TRAFFIC
 SIGNAL

CONSTANT FULL WIDTH LANES

NOT TO SCALE

TRAFFIC CONCEPTS, INC.
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 410-760-2911
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 EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DR @ HILLSMERE DR/BAY RIDGE RD

CITY: ANNAPOLIS

COUNT BY: A. NEUSE / B. PAGE

DATE: FEBRUARY 28, 2017

WEATHER: OVERCAST

DAY: TUESDAY

TIME	HILLSMERE DR NORTHBOUND			BAY RIDGE AVE SOUTHBOUND			FOREST DR EASTBOUND			FOREST DR WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
AM													
7:00-7:15	65	17	8	25	6	2	0	103	25	5	228	56	540
7:15-7:30	70	20	14	31	12	1	2	133	21	12	216	88	620
7:30-7:45	78	26	9	59	12	5	4	137	33	12	246	109	730
7:45-8:00	98	24	16	59	22	4	5	180	78	28	308	76	898
8:00-8:15	126	44	23	73	55	1	7	193	164	38	384	79	1187
8:15-8:30	174	36	40	52	18	5	4	133	52	24	243	64	845
8:30-8:45	69	18	24	56	13	4	4	184	31	14	270	77	764
8:45-9:00	88	18	31	65	13	6	5	153	34	18	238	81	750
AM PEAK HR 7:45-8:45 TOTALS	467	122	103	240	108	14	20	690	325	104	1205	296	PHF 0.78
PM													
4:00-4:15	74	24	22	91	21	6	3	222	95	27	224	60	869
4:15-4:30	74	16	17	94	44	8	5	229	88	23	184	51	833
4:30-4:45	80	22	21	91	29	4	8	257	81	21	195	65	874
4:45-5:00	75	36	29	103	38	7	7	264	116	30	205	65	975
5:00-5:15	75	31	19	88	38	4	7	245	76	45	194	74	896
5:15-5:30	74	29	30	94	30	8	2	262	72	29	216	81	927
5:30-5:45	85	27	30	80	26	5	6	224	90	31	176	79	859
5:45-6:00	56	23	14	72	26	5	6	289	81	23	176	53	824
PM PEAK HR 4:30-5:30 TOTALS	304	118	99	376	135	23	24	1028	345	125	810	285	PHF 0.94

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PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DRIVE/BAY RIDGE ROAD @ HILLSMERE DRIVE/
BAY RIDGE AVENUE
COUNT BY: A. NEUSE / B. PAGE

CITY: ANNAPOLIS

DATE: MARCH 4, 2017

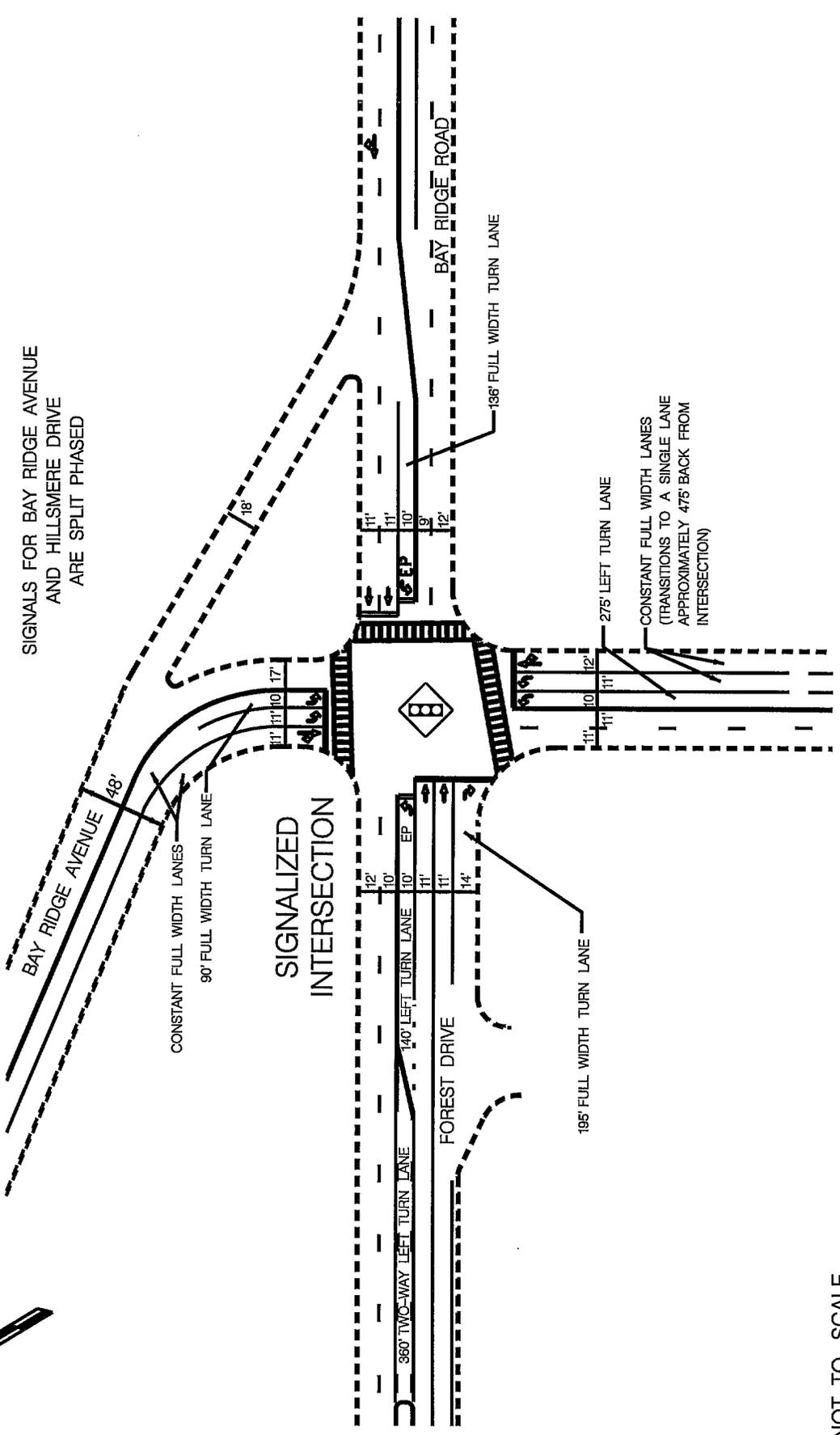
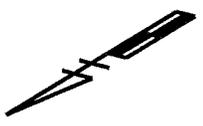
WEATHER: CLEAR

DAY: SATURDAY

TIME	HILLSMERE DRIVE NORTHBOUND			BAY RIDGE AVENUE SOUTHBOUND			FOREST DRIVE EASTBOUND			BAY RIDGE ROAD WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15	84	20	26	58	27	7	7	171	68	21	198	72	759
11:15-11:30	89	22	20	66	28	8	10	177	64	14	184	46	728
11:30-11:45	71	21	21	71	28	7	10	168	73	24	205	70	769
11:45-12:00	88	20	37	79	28	11	9	189	67	15	188	65	796
12:00-12:15	84	29	23	80	28	4	7	166	71	19	234	43	788
12:15-12:30	76	22	23	76	27	7	3	165	63	16	205	75	758
12:30-12:45	87	27	14	67	35	9	10	167	67	24	204	58	769
12:45-1:00	77	19	26	72	34	8	8	190	83	19	192	53	781
1:00-1:15	88	26	24	67	27	9	5	151	77	14	196	71	755
1:15-1:30	71	16	19	88	29	10	8	177	73	23	168	53	735
1:30-1:45	75	16	22	65	25	16	12	160	61	17	170	71	710
1:45-2:00	71	24	16	86	36	14	6	207	75	25	170	54	784
PEAK HOUR 11:45-12:45 TOTALS	335	98	97	302	118	31	29	687	268	74	831	241	PHF 0.98

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M:2690



SIGNALS FOR BAY RIDGE AVENUE AND HILLSMERE DRIVE ARE SPLIT PHASED

SIGNALIZED INTERSECTION

NOT TO SCALE

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 EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

HILLSMERE DRIVE

DATE: MARCH, 2017 FILE # 2690

EXISTING INTERSECTION CONFIGURATION
 FOREST DRIVE/BAY RIDGE ROAD @
 HILLSMERE DRIVE/BAY RIDGE AVENUE
 ANNE ARUNDEL COUNTY, MARYLAND

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: BAY RIDGE ROAD @ GEORGETOWN ROAD

CITY: ANNAPOLIS

COUNT BY: P. PIRMANN

DATE: FEBRUARY 28, 2017

WEATHER: OVERCAST

DAY: TUESDAY

TIME	NORTHBOUND			GEORGETOWN RD SOUTHBOUND			BAY RIDGE RD EASTBOUND			BAY RIDGE RD WESTBOUND			TOTAL	
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT		
AM														
7:00-7:15				0		57	17	112				225	1	412
7:15-7:30				1		60	28	117				257	0	463
7:30-7:45				2		70	33	141				312	3	561
7:45-8:00				2		71	34	193				342	5	647
8:00-8:15				1		71	37	231				338	4	682
8:15-8:30				1		59	41	170				282	2	555
8:30-8:45				7		70	42	168				277	3	567
8:45-9:00				1		50	41	196				293	4	585
PEAK HR 7:45-8:45 TOTALS				11		271	154	762				1239	14	PHF 0.90
PM														
4:00-4:15				3		59	68	222				201	5	558
4:15-4:30				1		66	96	214				201	4	582
4:30-4:45				4		72	108	260				193	5	642
4:45-5:00				0		73	91	250				221	4	639
5:00-5:15				2		55	96	257				240	2	652
5:15-5:30				7		81	114	258				237	5	702
5:30-5:45				2		85	79	257				211	9	643
5:45-6:00				7		69	111	246				162	4	599
PEAK HR 4:45-5:45 TOTALS				11		294	380	1022				909	20	PHF 0.94

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 HANOVER, MARYLAND 21076
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 E-MAIL TRAFFIC@TRAFFIC-CONCEPTS.COM

M:2690 ✓

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: BAY RIDGE ROAD @ GEORGETOWN ROAD

CITY: ANNAPOLIS

COUNT BY: P. PIRMANN

DATE: FEBRUARY 25, 2017

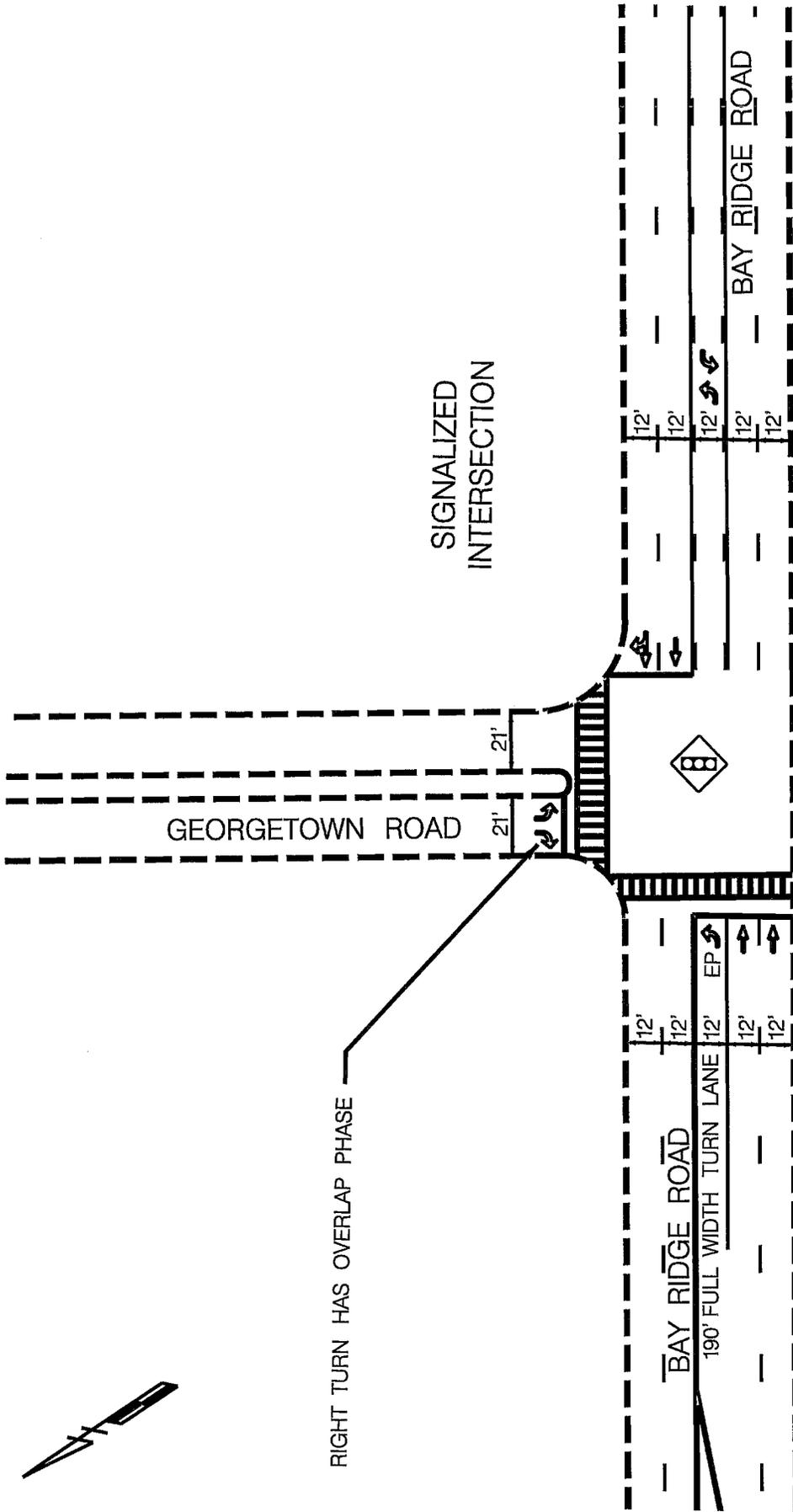
WEATHER: CLEAR

DAY: SATURDAY

TIME	NORTHBOUND			GEORGETOWN ROAD SOUTHBOUND			BAY RIDGE ROAD EASTBOUND			BAY RIDGE ROAD WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15				1		81	78	168			215	9	552
11:15-11:30				3		79	68	150			216	5	521
11:30-11:45				3		75	99	161			210	7	555
11:45-12:00				5		93	84	163			204	4	553
12:00-12:15				3		73	77	174			206	12	545
12:15-12:30				3		81	86	175			188	6	539
12:30-12:45				5		94	85	165			195	8	552
12:45-1:00				2		78	76	188			203	4	551
1:00-1:15				4		66	71	197			203	1	542
1:15-1:30				5		94	77	182			199	3	560
1:30-1:45				5		73	91	194			162	6	531
1:45-2:00				5		68	78	207			227	15	600
PEAK HOUR 1:00-2:00 TOTALS				19		301	317	780			791	25	PHF 0.93

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M:2690



NOT TO SCALE

TRAFFIC CONCEPTS, INC.
 7525 Connelley Drive, Suite B
 Hanover, MD, 21076
 410-760-5911
 FAX 410-760-5915
 EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

DATE: MARCH, 2017 FILE # 2690

EXISTING INTERSECTION CONFIGURATION
 BAY RIDGE ROAD AND
 GEORGETOWN ROAD
 ANNE ARUNDEL COUNTY, MARYLAND

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: BAY RIDGE ROAD @ EDGEWOOD ROAD

CITY: ANNAPOLIS

COUNT BY: A. NEUSE

DATE: SEPTEMBER 27, 2016

WEATHER: CLEAR

DAY: TUESDAY

TIME	EDGEWOOD RD NORTHBOUND			EDGEWOOD RD SOUTHBOUND			BAY RIDGE RD EASTBOUND			BAY RIDGE RD WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
AM													
7:00-7:15	0	0	0	7	0	76	49	56	1	0	176	4	369
7:15-7:30	0	0	1	5	0	83	47	68	3	1	224	14	446
7:30-7:45	0	1	0	1	0	114	48	84	1	0	219	12	480
7:45-8:00	0	0	0	10	0	76	94	143	3	1	228	11	566
8:00-8:15	1	0	0	10	0	94	71	135	0	2	281	13	607
8:15-8:30	0	1	3	14	0	100	64	121	6	0	202	14	525
8:30-8:45	4	1	1	10	3	93	69	111	3	2	177	13	487
8:45-9:00	0	1	0	6	0	78	78	136	5	1	245	17	567
PEAK HR 8:00-9:00 TOTALS	5	3	4	40	3	365	282	503	14	5	905	57	PHF 0.90
PM													
4:00-4:15	5	2	1	17	1	86	91	152	8	0	121	12	496
4:15-4:30	5	3	3	18	2	86	69	163	7	3	132	15	506
4:30-4:45	9	6	1	35	1	102	77	148	8	1	118	18	524
4:45-5:00	3	1	5	20	3	96	73	182	9	3	146	17	558
5:00-5:15	6	5	4	24	0	97	96	213	8	1	127	19	600
5:15-5:30	5	5	1	34	2	92	98	202	9	0	134	17	599
5:30-5:45	6	7	1	29	0	92	99	204	4	3	141	18	604
5:45-6:00	6	1	1	39	2	93	81	211	4	1	124	11	574
PEAK HR 5:00-6:00 TOTALS	23	18	7	126	4	374	374	830	25	5	526	65	PHF 0.98

TRAFFIC CONCEPTS, INC.
 7525 CONNELLEY DRIVE, SUITE B
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M:13284 ✓
 2690

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: BAY RIDGE ROAD @ EDGEWOOD ROAD

CITY: ANNAPOLIS

COUNT BY: A. NEUSE

DATE: FEBRUARY 11, 2017

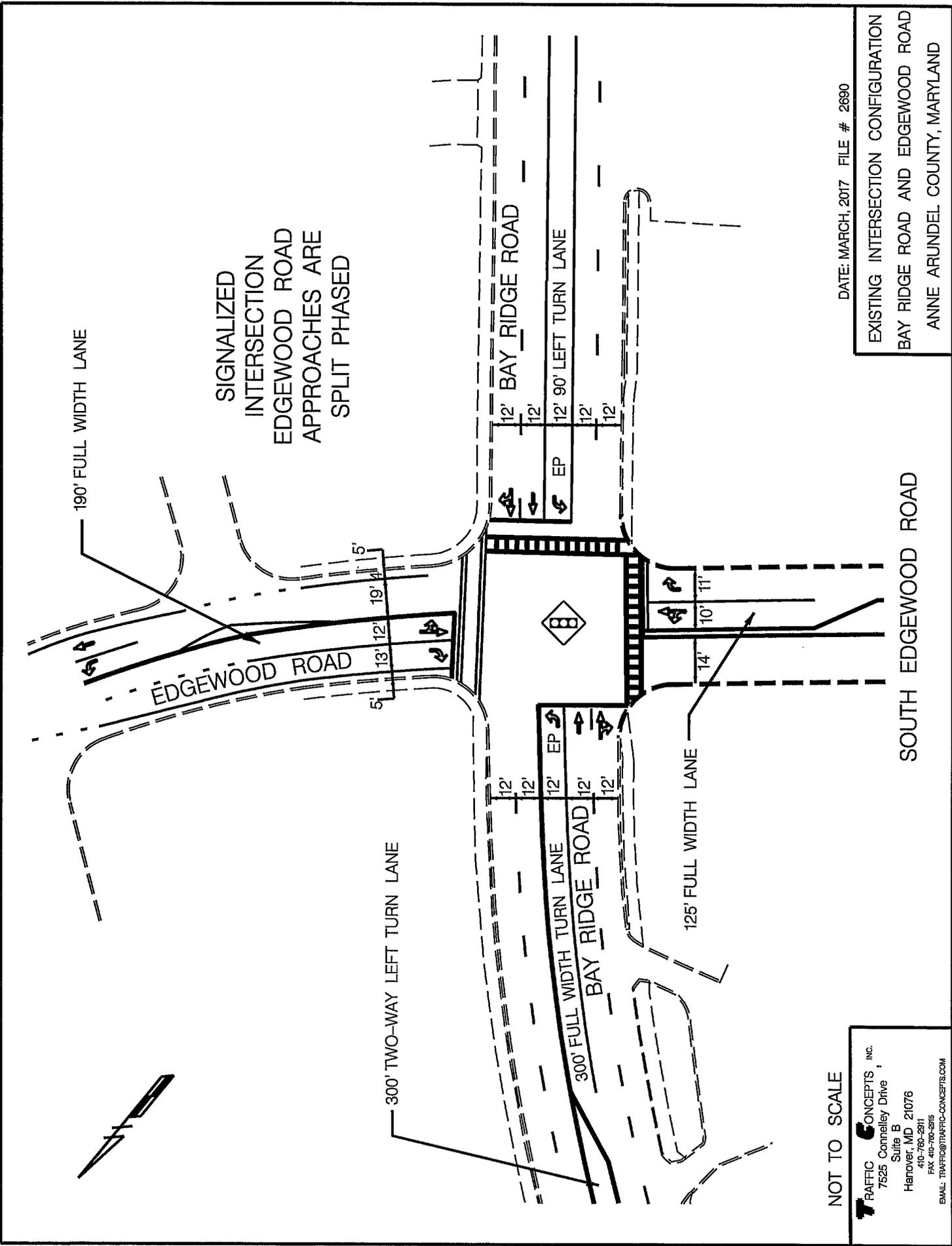
WEATHER: CLEAR

DAY: SATURDAY

TIME	EDGEWOOD ROAD NORTHBOUND			EDGEWOOD ROAD SOUTHBOUND			BAY RIDGE ROAD EASTBOUND			BAY RIDGE ROAD WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15	5	2	0	11	4	62	60	85	10	1	115	11	366
11:15-11:30	10	1	2	13	1	72	52	105	9	1	149	17	432
11:30-11:45	9	3	0	14	0	69	52	95	7	3	132	10	394
11:45-12:00	6	0	0	15	5	69	62	105	9	1	143	10	425
12:00-12:15	5	5	1	20	6	89	62	109	12	0	131	11	451
12:15-12:30	9	3	0	17	0	68	61	122	11	3	149	11	454
12:30-12:45	3	3	1	18	2	72	59	105	3	3	118	14	401
12:45-1:00	9	3	0	18	1	71	57	114	9	3	135	17	437
1:00-1:15	5	0	1	21	2	60	63	101	13	1	107	17	391
1:15-1:30	7	3	2	25	1	57	73	128	6	2	127	13	444
1:30-1:45	4	2	4	16	1	70	79	122	12	3	108	19	440
1:45-2:00	2	2	2	13	0	57	66	134	7	2	109	13	407
PEAK HOUR 12:00-1:00 TOTALS	26	14	2	73	9	300	239	450	35	9	533	53	PHF 0.96

TRAFFIC CONCEPTS, INC.
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M:2690



SIGNALIZED
INTERSECTION
EDGEWOOD ROAD
APPROACHES ARE
SPLIT PHASED

190' FULL WIDTH LANE

EDGEWOOD ROAD

300' TWO-WAY LEFT TURN LANE

300' FULL WIDTH TURN LANE
BAY RIDGE ROAD

125' FULL WIDTH LANE

12' BAY RIDGE ROAD

12' 90' LEFT TURN LANE

SOUTH EDGEWOOD ROAD

NOT TO SCALE

TRAFFIC CONCEPTS, INC.
7525 Connelley Drive,
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EMAIL: TRAFFIC@TRAFFIC-CONCEPTS.COM

DATE: MARCH, 2017 FILE # 2690

EXISTING INTERSECTION CONFIGURATION
BAY RIDGE ROAD AND EDGEWOOD ROAD
ANNE ARUNDEL COUNTY, MARYLAND

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DR @ TYLER AVENUE

CITY: ANNAPOLIS

COUNT BY: B. PAGE / A. NEUSE

DATE: JUNE 1, 2017

WEATHER: CLEAR

DAY: THURSDAY

TIME	TYLER AVENUE NORTHBOUND			TYLER AVENUE SOUTHBOUND			FOREST DR EASTBOUND			FOREST DR WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
AM													
7:00-7:15	11	0	0	4	1	29	20	167	4	2	414	2	654
7:15-7:30	11	2	2	3	0	38	12	193	10	1	365	1	638
7:30-7:45	8	3	2	1	1	35	18	208	11	4	477	7	775
7:45-8:00	9	1	1	6	1	32	24	334	2	2	482	6	900
8:00-8:15	10	3	3	4	3	43	30	359	7	2	450	3	917
8:15-8:30	6	2	4	5	0	63	25	315	6	2	425	4	857
8:30-8:45	8	1	7	3	0	35	15	266	6	6	417	3	767
8:45-9:00	8	2	7	3	1	35	15	275	9	7	451	5	818
AM PEAK HR 7:30-8:30 TOTALS	33	9	10	16	5	173	97	1216	26	10	1834	20	PHF 0.94
PM													
4:00-4:15	15	4	1	10	4	34	37	386	18	2	305	12	828
4:15-4:30	14	11	3	6	3	30	30	374	23	9	346	7	856
4:30-4:45	14	5	4	6	8	30	39	362	11	2	355	6	842
4:45-5:00	17	3	7	7	6	29	33	396	25	7	297	9	836
5:00-5:15	10	1	6	13	4	42	31	437	18	4	361	9	936
5:15-5:30	19	2	3	5	4	30	37	408	16	5	322	6	857
5:30-5:45	11	3	7	11	1	20	33	412	15	7	292	5	817
5:45-6:00	9	11	3	11	0	32	26	374	15	4	305	5	795
PM PEAK HR 4:30-5:30 TOTALS	60	11	20	31	22	131	140	1603	70	18	1335	30	PHF 0.93

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M:\ 2690

PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DRIVE @ TYLER AVENUE

CITY: ANNAPOLIS

COUNT BY: C. IRVINE / J. STRASBAUGH

DATE: JUNE 3, 2017

WEATHER: CLEAR

DAY: SATURDAY

TIME	TYLER AVENUE NORTHBOUND			TYLER AVENUE SOUTHBOUND			FOREST DRIVE EASTBOUND			FOREST DRIVE WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15	9	2	1	8	0	14	13	327	6	6	383	9	778
11:15-11:30	12	2	1	7	3	23	16	320	5	6	377	5	777
11:30-11:45	13	1	2	7	0	22	20	319	16	4	362	12	778
11:45-12:00	11	2	3	11	5	24	23	329	5	3	400	8	824
12:00-12:15	10	4	2	6	0	26	28	335	8	1	367	7	794
12:15-12:30	10	2	3	9	6	18	19	349	10	5	382	4	817
12:30-12:45	10	2	2	7	2	20	32	357	11	6	372	6	827
12:45-1:00	11	4	4	5	3	18	28	364	11	1	365	4	818
1:00-1:15	3	0	0	6	1	16	16	356	12	1	424	6	841
1:15-1:30	10	6	3	13	0	43	38	334	9	4	319	12	791
1:30-1:45	5	1	2	7	1	20	29	327	5	4	330	12	743
1:45-2:00	11	4	4	8	4	22	28	346	21	3	297	10	758
PEAK HR 12:15-1:15	34	8	9	27	12	72	95	1426	44	13	1543	20	PHF 0.98
TOTALS													

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PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DR @ ANNAPOLIS NECK ROAD

CITY: ANNAPOLIS

COUNT BY: J. ROBERTSON / J. BRASHEARS

DATE: JUNE 1, 2017

WEATHER: CLEAR

DAY: THURSDAY

TIME	ANNAPOLIS NECK RD NORTHBOUND			MARTHA CT SOUTHBOUND			FOREST DR EASTBOUND			FOREST DR WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
AM													
7:00-7:15	1	0	0	1	0	9	3	151	0	0	310	2	477
7:15-7:30	1	0	0	0	0	2	3	153	0	0	309	1	469
7:30-7:45	2	0	0	0	0	8	3	178	0	0	415	3	609
7:45-8:00	2	0	1	0	0	10	3	291	0	0	420	4	731
8:00-8:15	0	0	0	0	0	2	2	352	1	0	390	1	748
8:15-8:30	0	0	0	1	0	6	1	276	0	1	370	1	656
8:30-8:45	1	0	2	0	0	6	0	238	2	0	269	2	520
8:45-9:00	0	0	1	0	0	2	1	277	0	0	331	0	612
AM PEAK HR 7:30-8:30 TOTALS	4	0	1	1	0	26	9	1097	1	1	1595	9	PHF 0.92
PM													
4:00-4:15	0	0	1	0	0	5	5	327	0	0	278	1	617
4:15-4:30	0	0	1	0	0	0	2	324	1	0	302	2	632
4:30-4:45	0	0	1	0	0	6	4	371	2	2	263	1	650
4:45-5:00	0	0	0	0	0	3	5	355	1	2	274	3	643
5:00-5:15	0	0	0	0	0	5	6	422	0	0	291	2	726
5:15-5:30	2	0	0	0	0	3	7	406	2	1	301	0	722
5:30-5:45	2	0	0	1	0	7	4	372	2	1	262	3	654
5:45-6:00	0	0	0	0	0	2	3	367	0	2	254	3	631
PM PEAK HR 4:45-5:45 TOTALS	4	0	0	1	0	18	22	1555	5	4	1128	8	PHF 0.95

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PEAK HOUR TURNING MOVEMENT COUNT

INTERSECTION: FOREST DRIVE @ ANNAPOLIS NECK ROAD

CITY: ANNAPOLIS

COUNT BY: B. PAGE / J. ROBERTSON

DATE: JUNE 3, 2017

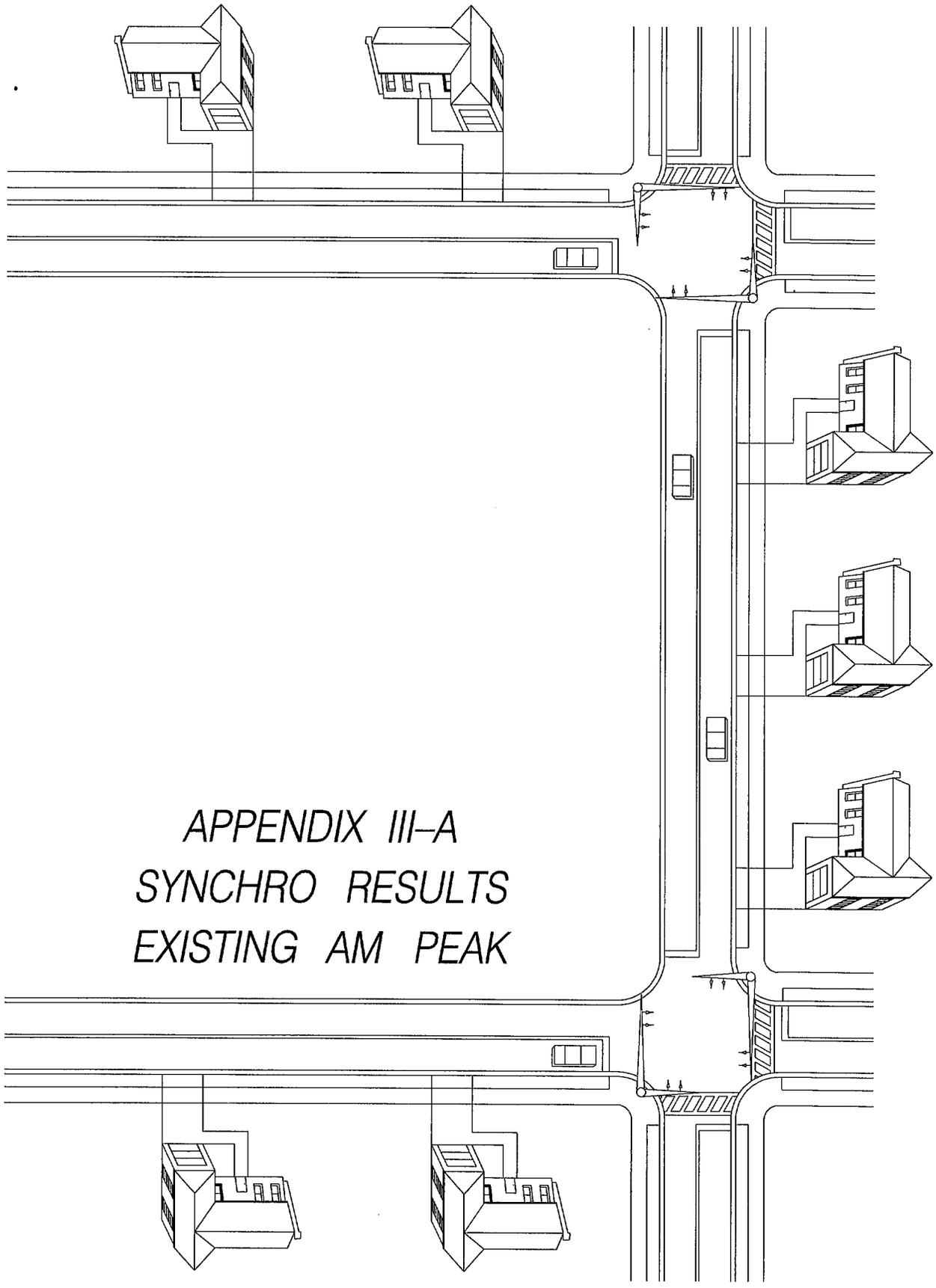
WEATHER: CLEAR

DAY: SATURDAY

TIME	ANNAPOLIS NECK RD NORTHBOUND			MARTHA COURT SOUTHBOUND			FOREST DRIVE EASTBOUND			FOREST DRIVE WESTBOUND			TOTAL
	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	LEFT	THRU	RIGHT	
11:00-11:15	3	0	0	0	0	6	4	292	0	0	337	0	642
11:15-11:30	0	0	0	2	0	4	1	345	0	0	336	0	688
11:30-11:45	3	0	0	1	0	2	1	272	1	1	340	3	624
11:45-12:00	0	0	1	1	0	5	3	316	2	0	344	4	676
12:00-12:15	2	0	0	1	0	2	4	306	0	1	328	3	647
12:15-12:30	1	0	1	0	0	8	2	334	0	1	348	1	696
12:30-12:45	0	0	1	0	0	1	1	315	1	1	329	1	650
12:45-1:00	0	0	0	0	0	3	3	355	2	0	328	2	693
1:00-1:15	0	0	2	1	0	7	3	329	2	1	346	0	691
1:15-1:30	1	0	0	0	0	2	3	320	2	1	279	3	611
1:30-1:45	1	0	1	0	0	3	2	253	4	1	322	4	591
1:45-2:00	2	0	0	0	0	2	5	351	0	0	276	1	637
PEAK HR 12:15-1:15	1	0	4	1	0	19	9	1333	5	3	1351	4	PHF 0.98
TOTALS													

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*APPENDIX III-A
SYNCHRO RESULTS
EXISTING AM PEAK*

Existing, AM
18: Spa Road & Forest Drive

06/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1199	164	6	1622	243	261	109	12	213	53	46
Future Volume (vph)	5	1199	164	6	1622	243	261	109	12	213	53	46
Satd. Flow (prot)	1787	3510	0	1787	3503	0	1698	1737	0	1698	1676	0
Flt Permitted	0.046			0.105			0.950	0.981		0.950	0.982	
Satd. Flow (perm)	87	3510	0	198	3503	0	1698	1737	0	1698	1676	0
Satd. Flow (RTOR)		19			21			2			13	
Lane Group Flow (vph)	5	1481	0	7	2027	0	204	211	0	172	168	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		6			2		3	3		4	4	
Permitted Phases	6			2								
Total Split (s)	87.0	87.0		87.0	87.0		25.0	25.0		28.0	28.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Act Effct Green (s)	87.4	87.4		87.4	87.4		19.2	19.2		18.8	18.8	
Actuated g/C Ratio	0.62	0.62		0.62	0.62		0.14	0.14		0.13	0.13	
v/c Ratio	0.09	0.67		0.06	0.92		0.88	0.88		0.75	0.71	
Control Delay	17.4	19.5		6.7	21.4		93.0	92.4		78.5	69.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.4	19.5		6.7	21.4		93.0	92.4		78.5	69.6	
LOS	B	B		A	C		F	F		E	E	
Approach Delay		19.5			21.3			92.7			74.1	
Approach LOS		B			C			F			E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 80 (57%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 31.8

Intersection LOS: C

Intersection Capacity Utilization 83.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 18: Spa Road & Forest Drive

Ø2 (R)		Ø3	Ø4
87 s		25 s	28 s
Ø6 (R)			
87 s			

Existing, AM

43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

06/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	690	325	104	1205	296	467	122	103	240	108	14
Future Volume (vph)	20	690	325	104	1205	296	467	122	103	240	108	14
Satd. Flow (prot)	1787	3574	1599	1787	3574	1599	3467	1751	0	3467	1849	0
Flt Permitted	0.116			0.263			0.950			0.950		
Satd. Flow (perm)	218	3574	1599	495	3574	1599	3467	1751	0	3467	1849	0
Satd. Flow (RTOR)			268			235		27			4	
Lane Group Flow (vph)	22	750	353	113	1310	322	508	245	0	261	132	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	1	6		5	2		8	8		7	7	
Permitted Phases	6		6	2		2						
Total Split (s)	12.0	60.0	60.0	18.0	66.0	66.0	34.0	34.0		28.0	28.0	
Total Lost Time (s)	5.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0		5.0	5.0	
Act Effct Green (s)	74.6	69.4	69.4	82.4	77.0	76.0	26.0	26.0		16.0	16.0	
Actuated g/C Ratio	0.53	0.50	0.50	0.59	0.55	0.54	0.19	0.19		0.11	0.11	
v/c Ratio	0.12	0.42	0.38	0.30	0.67	0.33	0.79	0.71		0.66	0.61	
Control Delay	8.0	10.4	1.8	18.9	36.3	14.4	63.5	58.4		67.2	69.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.0	10.4	1.8	18.9	36.3	14.4	63.5	58.4		67.2	69.2	
LOS	A	B	A	B	D	B	E	E		E	E	
Approach Delay		7.6			31.1			61.9			67.9	
Approach LOS		A			C			E			E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 90 (64%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 33.9

Intersection LOS: C

Intersection Capacity Utilization 72.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

12 s	66 s	28 s	34 s
18 s	60 s		

Existing, AM
46: Bay Ridge Road & Georgetown Road

06/21/2017



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↑↑		↖	↗
Traffic Volume (vph)	154	762	1239	14	11	271
Future Volume (vph)	154	762	1239	14	11	271
Satd. Flow (prot)	1787	3574	3567	0	1787	1599
Flt Permitted	0.154				0.950	
Satd. Flow (perm)	290	3574	3567	0	1787	1599
Satd. Flow (RTOR)			2			214
Lane Group Flow (vph)	167	828	1362	0	12	295
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	1	6	2		4	
Permitted Phases	6		2			4
Total Split (s)	20.0	114.0	94.0		26.0	26.0
Total Lost Time (s)	5.0	4.0	4.0		5.0	5.0
Act Effct Green (s)	116.5	117.5	104.2		13.5	13.5
Actuated g/C Ratio	0.83	0.84	0.74		0.10	0.10
v/c Ratio	0.50	0.28	0.51		0.07	0.85
Control Delay	10.1	5.4	3.7		54.4	39.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	10.1	5.4	3.7		54.4	39.7
LOS	B	A	A		D	D
Approach Delay		6.2	3.7		40.3	
Approach LOS		A	A		D	

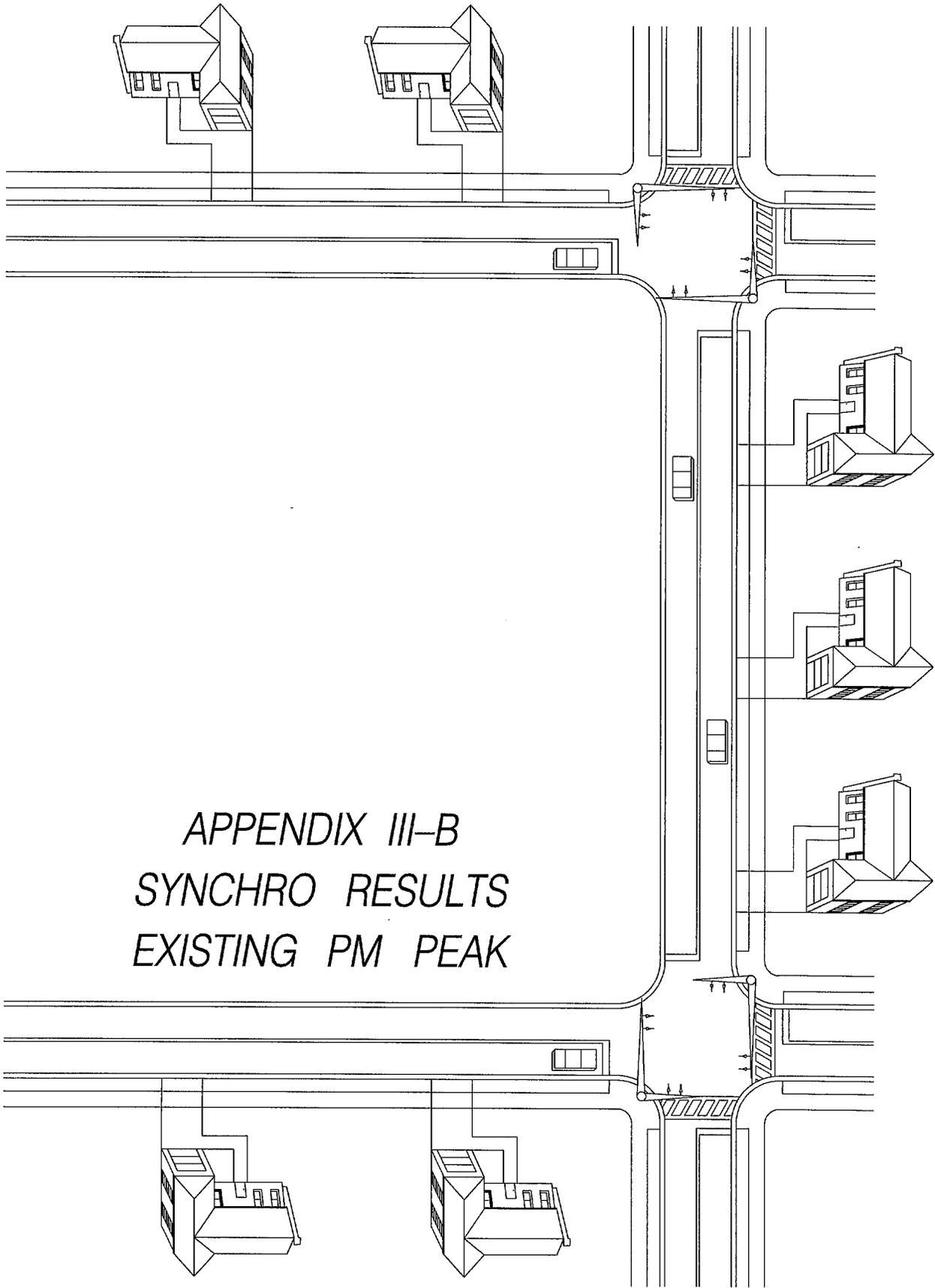
Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 130 (93%), Referenced to phase 2:WBT and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 8.9
 Intersection LOS: A
 Intersection Capacity Utilization 59.0%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 46: Bay Ridge Road & Georgetown Road

Ø1	Ø2 (R)	Ø4
20 s	94 s	26 s
Ø6 (R)		
114 s		

*APPENDIX III-B
SYNCHRO RESULTS
EXISTING PM PEAK*



Existing, PM
37: Tyler Avenue & Forest Drive

06/21/2017



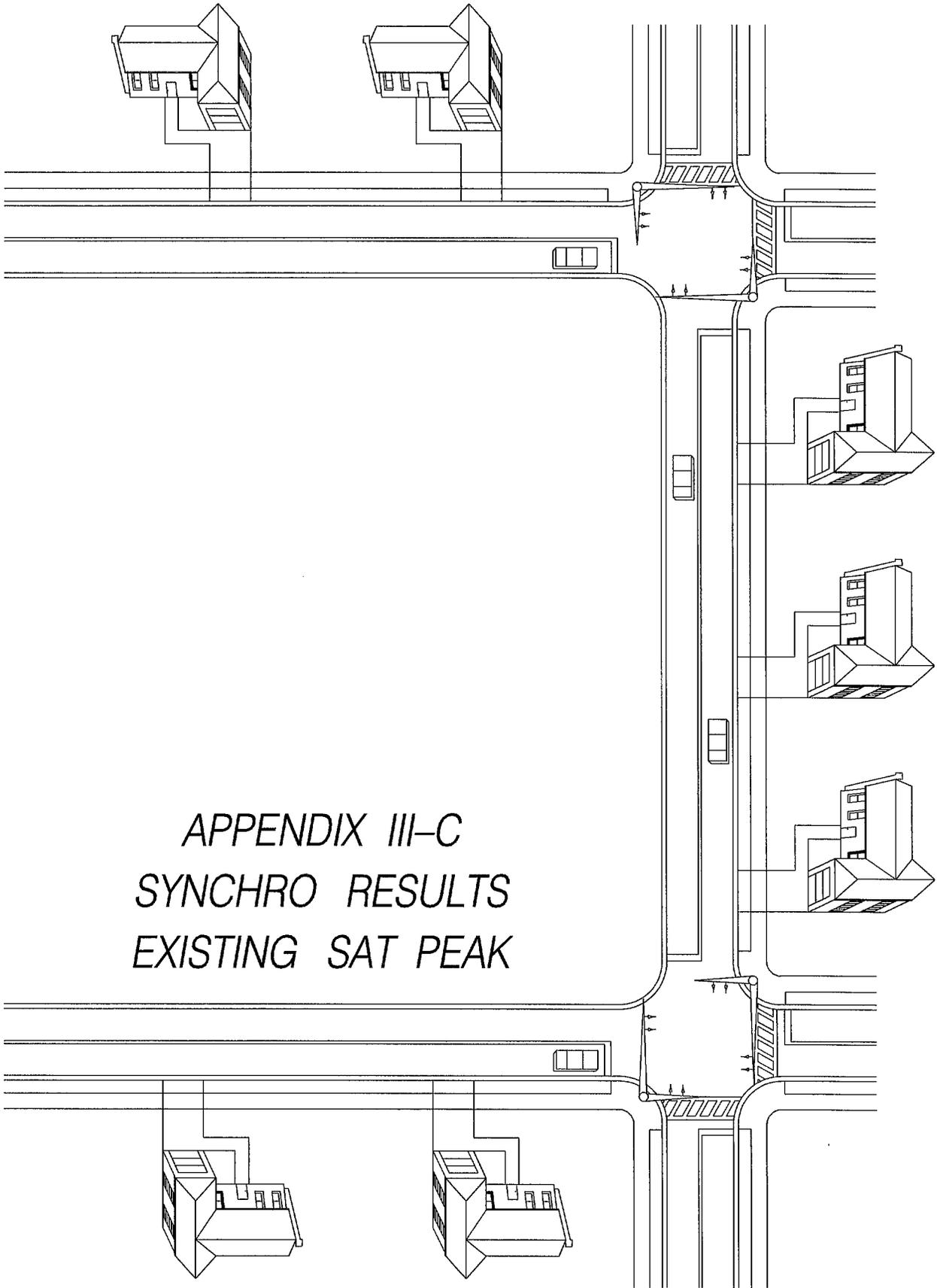
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	1603	70	18	1335	30	60	11	20	31	22	131
Future Volume (vph)	140	1603	70	18	1335	30	60	11	20	31	22	131
Satd. Flow (prot)	1770	3518	0	1770	3529	0	0	1749	0	0	1811	1583
Flt Permitted	0.128			0.089				0.767			0.778	
Satd. Flow (perm)	238	3518	0	166	3529	0	0	1386	0	0	1449	1583
Satd. Flow (RTOR)		7			4			9				64
Lane Group Flow (vph)	152	1818	0	20	1484	0	0	99	0	0	58	142
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	1	6		5	2			4			8	1
Permitted Phases	6			2			4			8		8
Total Split (s)	14.0	102.0		12.0	100.0		26.0	26.0		26.0	26.0	14.0
Total Lost Time (s)	5.0	4.5		5.0	4.5			5.0			5.0	5.0
Act Effect Green (s)	113.2	108.6		107.8	102.4			15.3			15.3	28.1
Actuated g/C Ratio	0.81	0.78		0.77	0.73			0.11			0.11	0.20
v/c Ratio	0.55	0.67		0.10	0.57			0.62			0.37	0.38
Control Delay	17.8	5.4		2.6	5.7			70.2			62.9	27.9
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	17.8	5.4		2.6	5.7			70.2			62.9	27.9
LOS	B	A		A	A			E			E	C
Approach Delay		6.4			5.7			70.2			38.1	
Approach LOS		A			A			E			D	

Intersection Summary

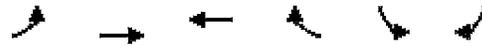
Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 10 (7%), Referenced to phase 2:WBT and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 9.5
 Intersection LOS: A
 Intersection Capacity Utilization 73.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 37: Tyler Avenue & Forest Drive

Ø1	Ø2 (R)	Ø4
14 s	100 s	26 s
Ø5	Ø6 (R)	Ø8
12 s	102 s	26 s



*APPENDIX III-C
SYNCHRO RESULTS
EXISTING SAT PEAK*

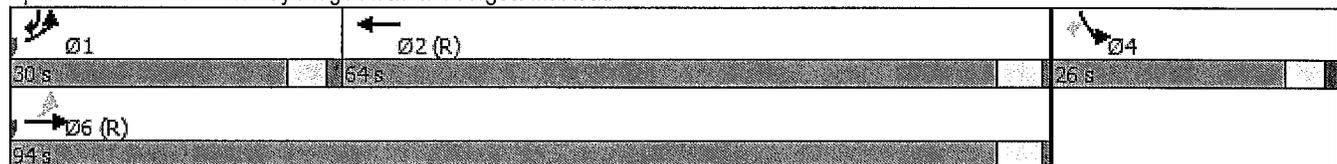


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↗		↙	↘
Traffic Volume (vph)	317	780	791	25	19	301
Future Volume (vph)	317	780	791	25	19	301
Satd. Flow (prot)	1770	3539	3522	0	1770	1583
Flt Permitted	0.266				0.950	
Satd. Flow (perm)	495	3539	3522	0	1770	1583
Satd. Flow (RTOR)			4			108
Lane Group Flow (vph)	345	848	887	0	21	327
Turn Type	pm+pt	NA	NA		Prot	pm+ov
Protected Phases	1	6	2		4	1
Permitted Phases	6	6	2			4
Total Split (s)	30.0	94.0	64.0		26.0	30.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Act Effect Green (s)	104.9	106.9	81.0		9.5	29.0
Actuated g/C Ratio	0.87	0.89	0.68		0.08	0.24
v/c Ratio	0.55	0.27	0.37		0.15	0.70
Control Delay	5.4	0.6	5.1		50.7	33.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	5.4	0.6	5.1		50.7	33.8
LOS	A	A	A		D	C
Approach Delay		2.0	5.1		34.8	
Approach LOS		A	A		C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 7.8
 Intersection Capacity Utilization 56.1%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 46: Bay Ridge Road & Georgetown Road



Existing, Saturday
49: Bay Ridge Road & Edgewood Road

06/21/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗			↖	↖↗		↖	↖↗
Traffic Volume (vph)	239	450	35	9	533	53	26	14	2	73	9	300
Future Volume (vph)	239	450	35	9	533	53	26	14	2	73	9	300
Satd. Flow (prot)	1770	3500	0	1770	3490	0	0	1803	1583	0	1785	1583
Flt Permitted	0.342			0.456				0.968			0.958	
Satd. Flow (perm)	637	3500	0	849	3490	0	0	1803	1583	0	1785	1583
Satd. Flow (RTOR)		9			9				155			326
Lane Group Flow (vph)	260	527	0	10	637	0	0	43	2	0	89	326
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	36.0	64.0		12.0	40.0		26.0	26.0	26.0	18.0	18.0	36.0
Total Lost Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0		5.0	5.0
Act Effct Green (s)	86.0	83.7		74.3	68.5		10.3	10.3	10.3		10.8	28.3
Actuated g/C Ratio	0.72	0.70		0.62	0.57		0.09	0.09	0.09		0.09	0.24
v/c Ratio	0.45	0.22		0.02	0.32		0.28	0.01	0.01		0.55	0.52
Control Delay	5.5	2.8		9.1	16.7		53.4	0.0	0.0		65.0	6.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0		0.0	0.0
Total Delay	5.5	2.8		9.1	16.7		53.4	0.0	0.0		65.0	6.6
LOS	A	A		A	B		D	A	A		E	A
Approach Delay		3.7			16.5		51.0				19.2	
Approach LOS		A			B		D				B	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 12.6

Intersection LOS: B

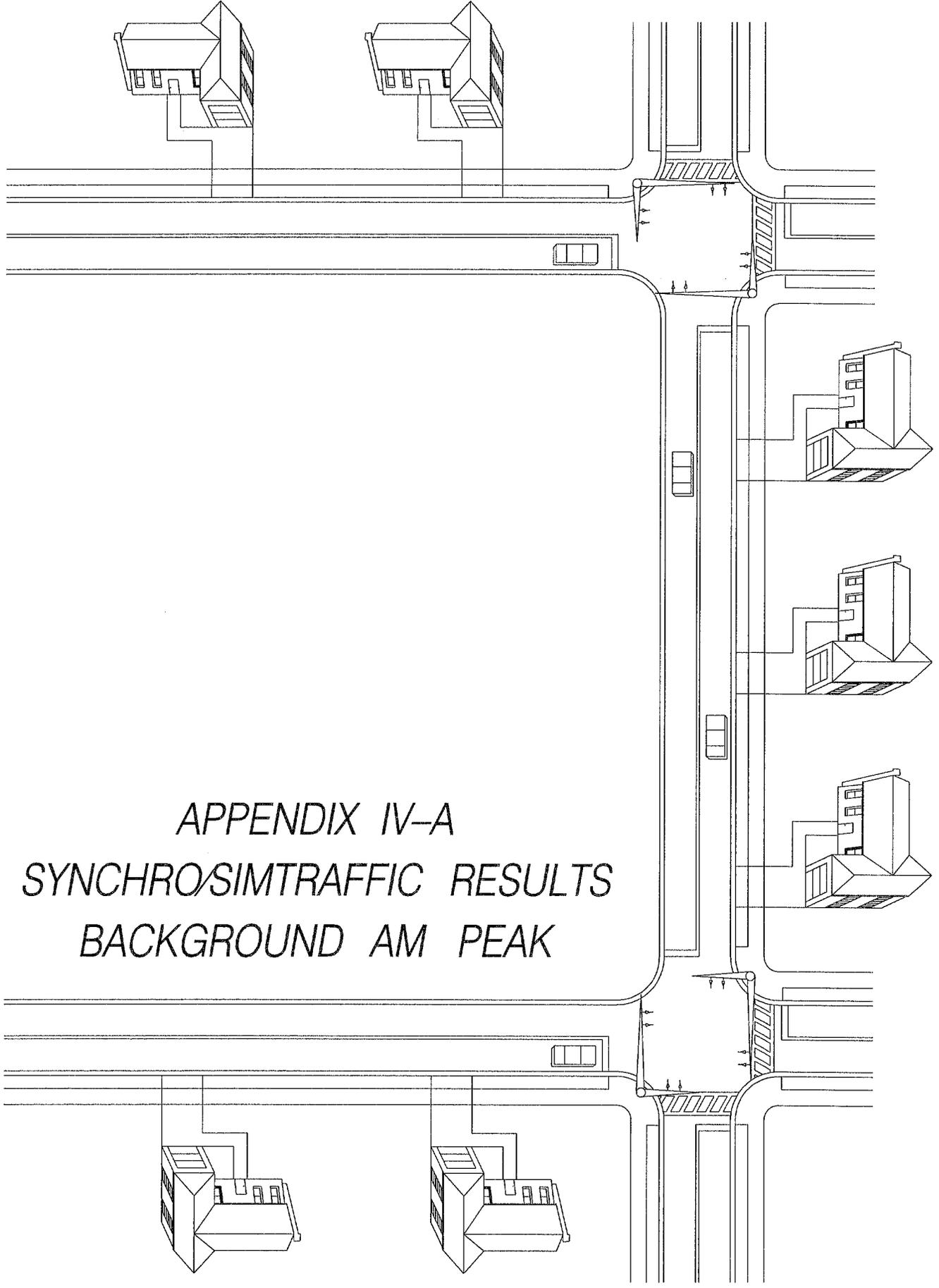
Intersection Capacity Utilization 53.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road

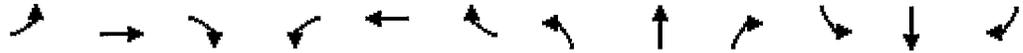
Ø1	Ø2 (R)	Ø3	Ø4
36 s	40 s	25 s	18 s
Ø5	Ø6 (R)		
12 s	64 s		



*APPENDIX IV-A
SYNCHRO/SIMTRAFFIC RESULTS
BACKGROUND AM PEAK*

Background, AM
18: Spa Road & Forest Drive

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	1384	174	12	1824	276	277	116	18	247	56	49
Future Volume (vph)	5	1384	174	12	1824	276	277	116	18	247	56	49
Satd. Flow (prot)	1787	3513	0	1787	3503	0	1698	1734	0	1698	1680	0
Flt Permitted	0.047			0.062			0.950	0.983		0.950	0.981	
Satd. Flow (perm)	88	3513	0	117	3503	0	1698	1734	0	1698	1680	0
Satd. Flow (RTOR)		17			21			3			12	
Lane Group Flow (vph)	5	1693	0	13	2283	0	223	224	0	193	189	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		6			2		3	3		4	4	
Permitted Phases	6			2								
Total Split (s)	87.0	87.0		87.0	87.0		25.0	25.0		28.0	28.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Act Effect Green (s)	85.8	85.8		85.8	85.8		19.8	19.8		19.9	19.9	
Actuated g/C Ratio	0.61	0.61		0.61	0.61		0.14	0.14		0.14	0.14	
v/c Ratio	0.09	0.78		0.18	1.06		0.93	0.91		0.80	0.76	
Control Delay	17.8	23.9		13.7	55.9		101.7	95.3		81.8	73.1	
Queue Delay	0.0	0.0		0.0	0.4		0.0	0.0		0.0	0.0	
Total Delay	17.8	23.9		13.7	56.3		101.7	95.3		81.8	73.1	
LOS	B	C		B	E		F	F		F	E	
Approach Delay		23.9			56.0			98.5			77.5	
Approach LOS		C			E			F			E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 80 (57%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 50.4

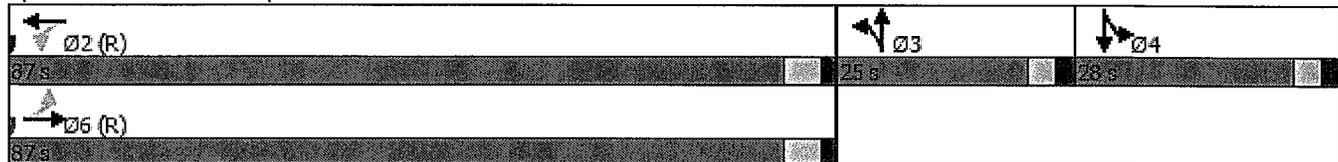
Intersection LOS: D

Intersection Capacity Utilization 92.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 18: Spa Road & Forest Drive



Background, AM

40: Annapolis Neck Road/Martha Court & Forest Drive

10/20/2017

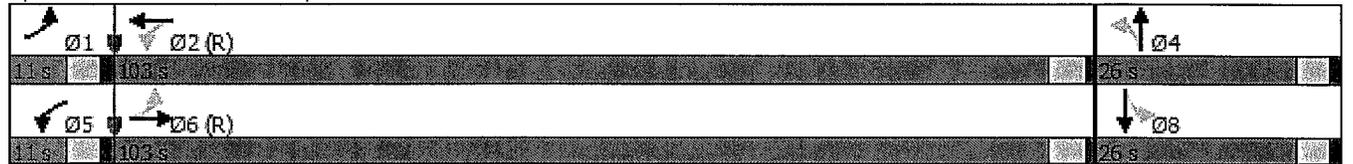


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	1211	15	12	1733	10	51	0	39	1	0	28
Future Volume (vph)	10	1211	15	12	1733	10	51	0	39	1	0	28
Satd. Flow (prot)	1787	3567	0	1787	3571	0	0	1722	0	0	1631	0
Flt Permitted	0.086			0.183				0.837			0.992	
Satd. Flow (perm)	162	3567	0	344	3571	0	0	1483	0	0	1622	0
Satd. Flow (RTOR)		2			1			55			55	
Lane Group Flow (vph)	11	1332	0	13	1895	0	0	97	0	0	31	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	11.0	103.0		11.0	103.0		26.0	26.0		26.0	26.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Act Effct Green (s)	117.9	115.6		118.0	115.6			10.1			10.1	
Actuated g/C Ratio	0.84	0.83		0.84	0.83			0.07			0.07	
v/c Ratio	0.05	0.45		0.04	0.64			0.62			0.19	
Control Delay	0.9	1.2		1.2	6.4			45.9			6.6	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	0.9	1.2		1.2	6.4			45.9			6.6	
LOS	A	A		A	A			D			A	
Approach Delay		1.2			6.4			45.9			6.6	
Approach LOS		A			A			D			A	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 15 (11%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 5.5
 Intersection LOS: A
 Intersection Capacity Utilization 68.4%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 40: Annapolis Neck Road/Martha Court & Forest Drive



Background, AM
49: Bay Ridge Road & Edgewood Road

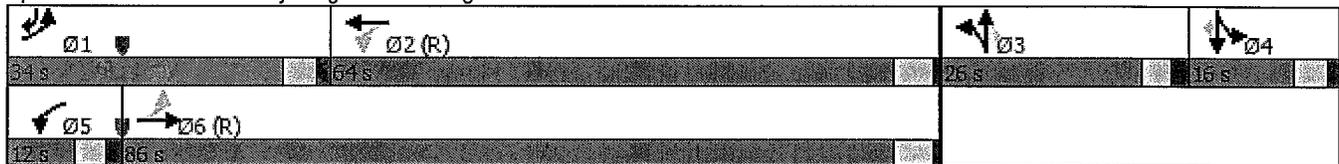
10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	301	546	54	62	963	60	39	13	56	42	13	391
Future Volume (vph)	301	546	54	62	963	60	39	13	56	42	13	391
Satd. Flow (prot)	1787	3524	0	1787	3542	0	0	1813	1599	0	1812	1599
Flt Permitted	0.166			0.404				0.964			0.963	
Satd. Flow (perm)	312	3524	0	760	3542	0	0	1813	1599	0	1812	1599
Satd. Flow (RTOR)		13			6				132			230
Lane Group Flow (vph)	327	652	0	67	1112	0	0	56	61	0	60	425
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	34.0	86.0		12.0	64.0		26.0	26.0	26.0	16.0	16.0	34.0
Total Lost Time (s)	5.0	4.0		5.0	4.0			5.0	5.0		5.0	5.0
Act Effct Green (s)	109.6	101.5		88.3	82.3			9.8	9.8		10.1	36.1
Actuated g/C Ratio	0.78	0.72		0.63	0.59			0.07	0.07		0.07	0.26
v/c Ratio	0.67	0.25		0.13	0.53			0.44	0.26		0.46	0.73
Control Delay	24.1	2.8		8.4	22.3			72.6	2.7		72.9	26.8
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	24.1	2.8		8.4	22.3			72.6	2.7		72.9	26.8
LOS	C	A		A	C			E	A		E	C
Approach Delay		9.9			21.5			36.2			32.5	
Approach LOS		A			C			D			C	

Intersection Summary
 Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 5 (4%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.73
 Intersection Signal Delay: 20.0 Intersection LOS: B
 Intersection Capacity Utilization 67.7% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road



Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	93	384	384	176	796	790	264	519	211	253
Average Queue (ft)	14	234	235	14	730	735	200	282	128	120
95th Queue (ft)	68	347	349	96	922	912	302	437	200	218
Link Distance (ft)		1700	1700		766	766		620	541	541
Upstream Blk Time (%)					7	8		0		
Queuing Penalty (veh)					76	81		0		
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		5			40		9	55		
Queuing Penalty (veh)		0			5		24	75		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	152	128	98	86	468	470	151	85	225
Average Queue (ft)	74	19	22	8	163	170	44	26	114
95th Queue (ft)	137	71	65	49	359	377	108	67	197
Link Distance (ft)		1418	1418		1823	1823	366	629	629
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	1	0			4				
Queuing Penalty (veh)	8	0			0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	27	130	136	32	207	228	155	69
Average Queue (ft)	5	40	51	6	67	82	73	24
95th Queue (ft)	22	100	120	26	150	171	133	55
Link Distance (ft)		1823	1823		2842	2842	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		0		0	4			
Queuing Penalty (veh)		0		0	1			

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	B45
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	T
Maximum Queue (ft)	76	340	324	175	164	598	611	276	200	354	296	105
Average Queue (ft)	27	176	171	99	90	383	402	185	173	244	153	5
95th Queue (ft)	61	282	290	200	185	573	606	398	227	350	267	48
Link Distance (ft)		2842	2842			1203	1203			293	293	222
Upstream Blk Time (%)										4	1	0
Queuing Penalty (veh)										0	0	0
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		0	10	0	0	28	17	0	3	28		
Queuing Penalty (veh)		0	36	0	3	33	56	1	8	70		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	SB	SB	SB	B44	B44
Directions Served	L	L	TR	T	T
Maximum Queue (ft)	170	148	165	75	66
Average Queue (ft)	104	85	109	4	7
95th Queue (ft)	160	135	172	36	35
Link Distance (ft)	115	115	115	719	719
Upstream Blk Time (%)	7	3	14		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 46: Bay Ridge Road & Georgetown Road

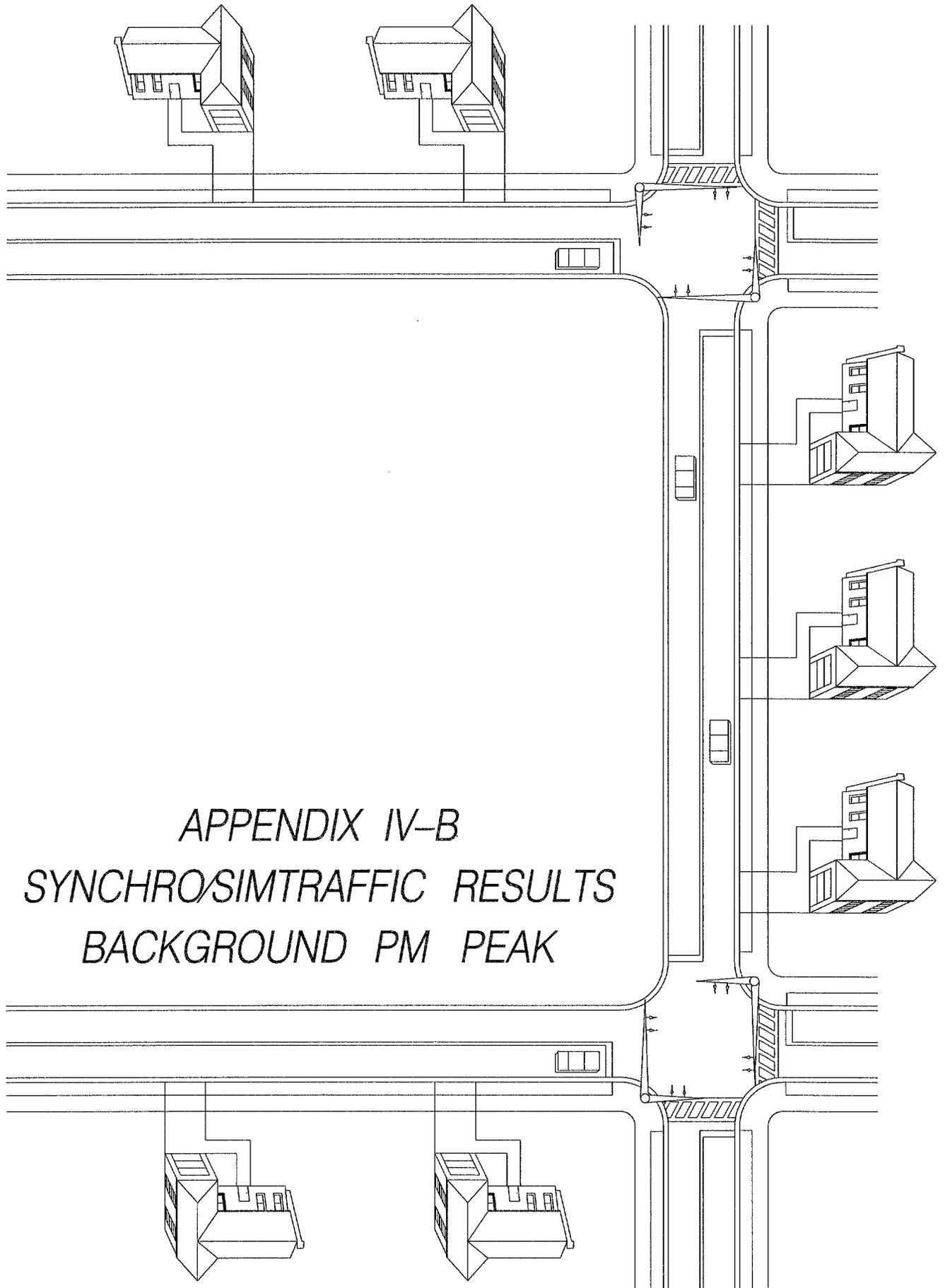
Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	152	69	78	31	215	245	113	59	241
Average Queue (ft)	69	9	11	7	93	108	50	17	119
95th Queue (ft)	126	41	45	25	179	203	95	49	204
Link Distance (ft)		1203	1203		645	645	153	722	722
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	0								
Queuing Penalty (veh)	0								

Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	257	218	81	174	409	354	112	59	117	263
Average Queue (ft)	130	20	26	43	196	166	50	29	56	139
95th Queue (ft)	234	105	64	125	333	297	93	54	103	230
Link Distance (ft)		645	645		777	777		226	593	593
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)	2				14		0			
Queuing Penalty (veh)	6				9		0			

Zone Summary

Zone wide Queuing Penalty: 493



*APPENDIX IV-B
SYNCHRO/SIMTRAFFIC RESULTS
BACKGROUND PM PEAK*

Background, PM
18: Spa Road & Forest Drive

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	2010	191	11	1427	257	193	89	36	300	79	19
Future Volume (vph)	7	2010	191	11	1427	257	193	89	36	300	79	19
Satd. Flow (prot)	1770	3493	0	1770	3458	0	1681	1691	0	1681	1701	0
Flt Permitted	0.046			0.046			0.950	0.989		0.950	0.975	
Satd. Flow (perm)	86	3493	0	86	3458	0	1681	1691	0	1681	1701	0
Satd. Flow (RTOR)		12			26			9			3	
Lane Group Flow (vph)	8	2393	0	12	1830	0	172	174	0	215	218	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		6			2		3	3		4	4	
Permitted Phases	6			2								
Total Split (s)	87.0	87.0		87.0	87.0		25.0	25.0		28.0	28.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		5.0	5.0		5.0	5.0	
Act Effect Green (s)	86.3	86.3		86.3	86.3		18.0	18.0		21.2	21.2	
Actuated g/C Ratio	0.62	0.62		0.62	0.62		0.13	0.13		0.15	0.15	
v/c Ratio	0.15	1.11		0.23	0.85		0.80	0.77		0.85	0.84	
Control Delay	21.6	83.3		12.5	16.9		84.6	78.1		85.5	83.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.6	83.3		12.5	16.9		84.6	78.1		85.5	83.6	
LOS	C	F		B	B		F	E		F	F	
Approach Delay		83.1			16.9			81.3			84.6	
Approach LOS		F			B			F			F	

Intersection Summary

Cycle Length: 140
 Actuated Cycle Length: 140
 Offset: 75 (54%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.11
 Intersection Signal Delay: 58.8 Intersection LOS: E
 Intersection Capacity Utilization 93.5% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 18: Spa Road & Forest Drive

 Ø2 (L) 87 s	 Ø3 25 s	 Ø4 28 s
 Ø5 (R) 87 s		

Background, PM
49: Bay Ridge Road & Edgewood Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	403	912	50	33	597	69	47	25	34	134	10	403
Future Volume (vph)	403	912	50	33	597	69	47	25	34	134	10	403
Satd. Flow (prot)	1770	3511	0	1770	3483	0	0	1803	1583	0	1781	1583
Flt Permitted	0.266			0.274				0.968			0.956	
Satd. Flow (perm)	495	3511	0	510	3483	0	0	1803	1583	0	1781	1583
Satd. Flow (RTOR)		6			10				132			280
Lane Group Flow (vph)	438	1045	0	36	724	0	0	78	37	0	157	438
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	40.0	82.0		12.0	54.0		26.0	26.0	26.0	20.0	20.0	40.0
Total Lost Time (s)	5.0	4.0		5.0	4.0			5.0	5.0		5.0	5.0
Act Effect Green (s)	95.7	87.4		72.1	66.7			12.5	12.5		16.8	46.8
Actuated g/C Ratio	0.68	0.62		0.52	0.48			0.09	0.09		0.12	0.33
v/c Ratio	0.77	0.48		0.11	0.43			0.48	0.14		0.74	0.61
Control Delay	28.8	6.1		12.8	27.6			69.3	1.1		79.4	15.8
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	28.8	6.1		12.8	27.6			69.3	1.1		79.4	15.8
LOS	C	A		B	C			E	A		E	B
Approach Delay		12.8			26.9			47.4			32.6	
Approach LOS		B			C			D			C	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 5 (4%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 21.7

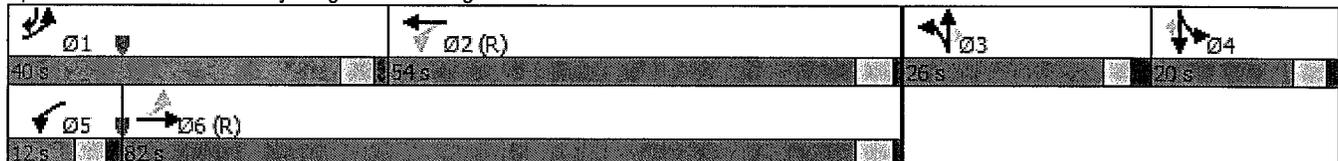
Intersection LOS: C

Intersection Capacity Utilization 67.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road



Background, PM
Queuing and Blocking Report

10/20/2017

Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	226	1753	1756	128	380	397	264	390	262	238
Average Queue (ft)	12	1716	1712	45	176	189	158	234	159	140
95th Queue (ft)	94	1792	1791	117	320	342	289	356	233	214
Link Distance (ft)		1699	1699		769	769		621	587	587
Upstream Blk Time (%)		62	60							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		44			6		2	37		
Queuing Penalty (veh)		3			1		5	35		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	161	232	218	57	227	223	185	129	149
Average Queue (ft)	70	82	97	18	76	74	84	52	61
95th Queue (ft)	131	171	187	48	165	159	150	108	115
Link Distance (ft)		1418	1418		1823	1823	415	636	636
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	2	1			0				
Queuing Penalty (veh)	14	1			0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	38	179	214	61	132	168	89	43
Average Queue (ft)	9	51	65	22	38	55	41	14
95th Queue (ft)	31	134	161	51	105	135	81	40
Link Distance (ft)		1823	1823		2844	2844	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		1		1	2			
Queuing Penalty (veh)		0		7	1			

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	B45
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	T
Maximum Queue (ft)	233	426	459	175	165	418	456	276	199	296	335	78
Average Queue (ft)	33	252	246	117	112	249	258	95	128	169	186	6
95th Queue (ft)	122	392	414	222	194	384	405	310	202	252	323	53
Link Distance (ft)		2844	2844			1203	1203			293	293	222
Upstream Blk Time (%)										0	5	0
Queuing Penalty (veh)										0	0	0
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		3	15	0	6	18	7	0	1	8		
Queuing Penalty (veh)		1	56	0	28	27	22	1	1	14		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	SB	SB	SB	B44	B44
Directions Served	L	L	TR	T	T
Maximum Queue (ft)	193	168	184	311	116
Average Queue (ft)	153	124	125	89	18
95th Queue (ft)	197	169	191	246	72
Link Distance (ft)	115	115	115	719	719
Upstream Blk Time (%)	35	22	23		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 46: Bay Ridge Road & Georgetown Road

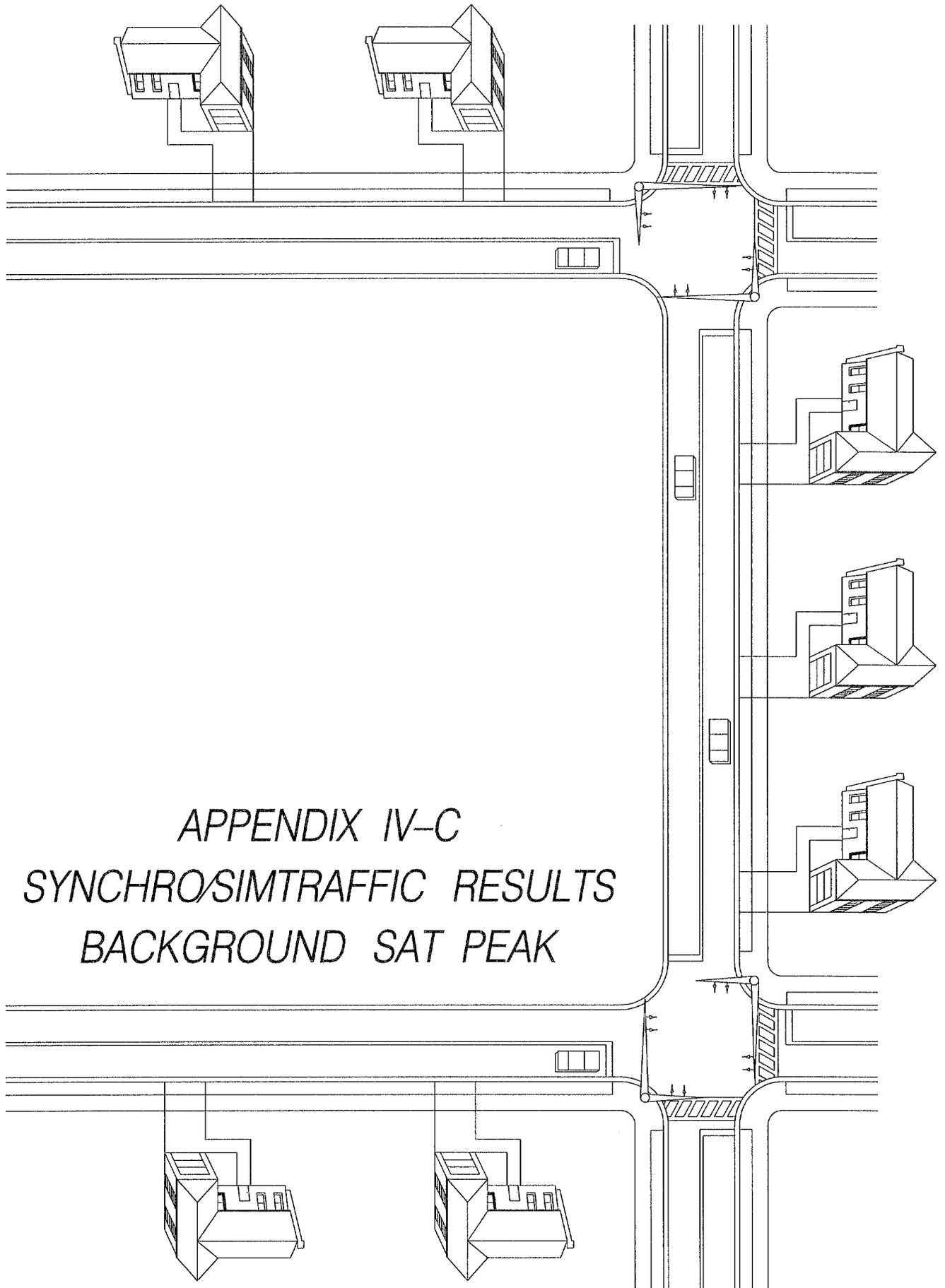
Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	214	372	227	232	333	356	183	63	248
Average Queue (ft)	151	74	38	31	132	151	162	17	115
95th Queue (ft)	238	262	122	118	263	289	198	50	204
Link Distance (ft)		1203	1203		638	638	153	722	722
Upstream Blk Time (%)							77		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	10	0			1				
Queuing Penalty (veh)	55	0			0				

Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	254	221	195	150	288	260	131	88	212	255
Average Queue (ft)	131	78	81	29	154	134	64	23	120	120
95th Queue (ft)	228	175	150	96	249	230	120	61	201	215
Link Distance (ft)		638	638		777	777		226	579	579
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)	2	0		0	10		1			
Queuing Penalty (veh)	7	0		0	3		0			

Zone Summary

Zone wide Queuing Penalty: 284



*APPENDIX IV-C
SYNCHRO/SIMTRAFFIC RESULTS
BACKGROUND SAT PEAK*

Background, Saturday
37: Tyler Avenue & Forest Drive

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	1616	47	14	1732	27	36	8	10	35	13	76
Future Volume (vph)	101	1616	47	14	1732	27	36	8	10	35	13	76
Satd. Flow (prot)	1770	3525	0	1770	3532	0	0	1758	0	0	1798	1583
Flt Permitted	0.057			0.092				0.769			0.783	
Satd. Flow (perm)	106	3525	0	171	3532	0	0	1397	0	0	1459	1583
Satd. Flow (RTOR)		5			2			8				23
Lane Group Flow (vph)	110	1808	0	15	1912	0	0	59	0	0	52	83
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	1	6		5	2			4			8	1
Permitted Phases	6			2			4			8		8
Total Split (s)	14.0	82.0		12.0	80.0		26.0	26.0		26.0	26.0	14.0
Total Lost Time (s)	5.0	5.5		5.0	5.5		5.0	5.0		5.0	5.0	5.0
Act Effect Green (s)	97.8	94.8		91.7	85.4		13.7	13.7		13.7	13.7	24.1
Actuated g/C Ratio	0.82	0.79		0.76	0.71		0.11	0.11		0.11	0.11	0.20
v/c Ratio	0.57	0.65		0.07	0.76		0.36	0.36		0.31	0.31	0.25
Control Delay	34.6	6.0		2.5	7.3		46.3	46.3		51.1	51.1	27.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	34.6	6.0		2.5	7.3		46.3	46.3		51.1	51.1	27.3
LOS	C	A		A	A		D	D		D	D	C
Approach Delay		7.7			7.2		46.3	46.3		36.5	36.5	
Approach LOS		A			A		D	D		D	D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 9.0

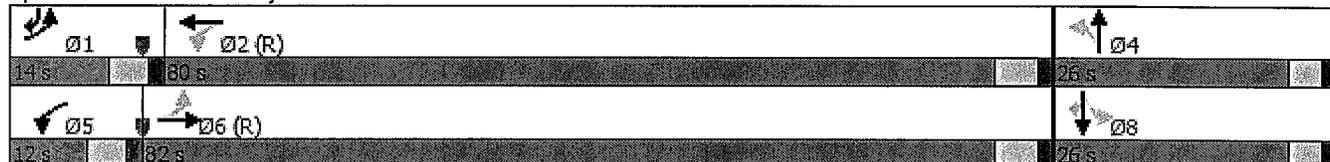
Intersection LOS: A

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 37: Tyler Avenue & Forest Drive



Background, Saturday
49: Bay Ridge Road & Edgewood Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	505	71	57	594	56	64	25	50	77	19	324
Future Volume (vph)	260	505	71	57	594	56	64	25	50	77	19	324
Satd. Flow (prot)	1770	3476	0	1770	3493	0	0	1798	1583	0	1792	1583
Flt Permitted	0.292			0.414				0.965			0.962	
Satd. Flow (perm)	544	3476	0	771	3493	0	0	1798	1583	0	1792	1583
Satd. Flow (RTOR)		18			8				155			280
Lane Group Flow (vph)	283	626	0	62	707	0	0	97	54	0	105	352
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	36.0	64.0		12.0	40.0		26.0	26.0	26.0	18.0	18.0	36.0
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Act Effect Green (s)	80.5	71.0		67.3	60.6			12.8	12.8		11.6	31.6
Actuated g/C Ratio	0.67	0.59		0.56	0.50			0.11	0.11		0.10	0.26
v/c Ratio	0.55	0.30		0.13	0.40			0.51	0.18		0.61	0.57
Control Delay	14.3	3.7		10.2	21.5			58.5	1.2		66.8	11.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	14.3	3.7		10.2	21.5			58.5	1.2		66.8	11.2
LOS	B	A		B	C			E	A		E	B
Approach Delay		7.0			20.6			38.0			24.0	
Approach LOS		A			C			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 17.0

Intersection LOS: B

Intersection Capacity Utilization 57.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road

Ø1 36 s	Ø2 (R) 40 s	Ø3 26 s	Ø4 18 s
Ø5 12 s	Ø6 (R) 64 s		

Background, Saturday
Queuing and Blocking Report

10/20/2017

Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	176	726	704	153	510	547	220	289	188	176
Average Queue (ft)	14	380	376	40	179	198	68	150	96	75
95th Queue (ft)	97	686	665	137	400	441	192	242	163	146
Link Distance (ft)		1699	1699		764	764		616	587	587
Upstream Blk Time (%)						0				
Queuing Penalty (veh)						0				
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		21		0	8		0	13		
Queuing Penalty (veh)		2		0	1		1	9		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	142	204	239	44	292	305	109	103	92
Average Queue (ft)	58	94	109	9	146	154	41	38	38
95th Queue (ft)	111	176	198	32	261	272	84	86	74
Link Distance (ft)		1417	1417		1822	1822	415	636	636
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	0	1			1				
Queuing Penalty (veh)	0	1			0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	54	248	268	56	102	93	137	47
Average Queue (ft)	7	81	96	23	24	31	51	16
95th Queue (ft)	35	195	219	49	74	82	104	43
Link Distance (ft)		1822	1822		2845	2845	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		3		0	1			
Queuing Penalty (veh)		0		1	0			

Background, Saturday
 Queuing and Blocking Report

10/20/2017

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	L
Maximum Queue (ft)	91	300	328	175	164	402	426	276	199	286	253	174
Average Queue (ft)	29	181	171	96	92	233	234	67	127	170	127	121
95th Queue (ft)	68	275	286	196	193	349	361	262	205	251	223	177
Link Distance (ft)		2845	2845			1203	1203			292	292	116
Upstream Blk Time (%)										0	0	12
Queuing Penalty (veh)										0	0	0
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		0	10	0	0	20	5	0	0	9		
Queuing Penalty (veh)		0	28	0	0	20	13	0	1	16		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

Movement	SB	SB	B44	B44
Directions Served	L	TR	T	T
Maximum Queue (ft)	156	166	117	62
Average Queue (ft)	94	113	16	7
95th Queue (ft)	144	178	87	36
Link Distance (ft)	116	116	719	719
Upstream Blk Time (%)	4	13		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 46: Bay Ridge Road & Georgetown Road

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	214	384	229	67	268	274	190	59	229
Average Queue (ft)	114	68	58	23	131	147	165	18	97
95th Queue (ft)	200	221	152	50	225	235	195	50	175
Link Distance (ft)		1203	1203		640	640	153	722	722
Upstream Blk Time (%)							81		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	4	0			0				
Queuing Penalty (veh)	15	0			0				

Background, Saturday
 Queuing and Blocking Report

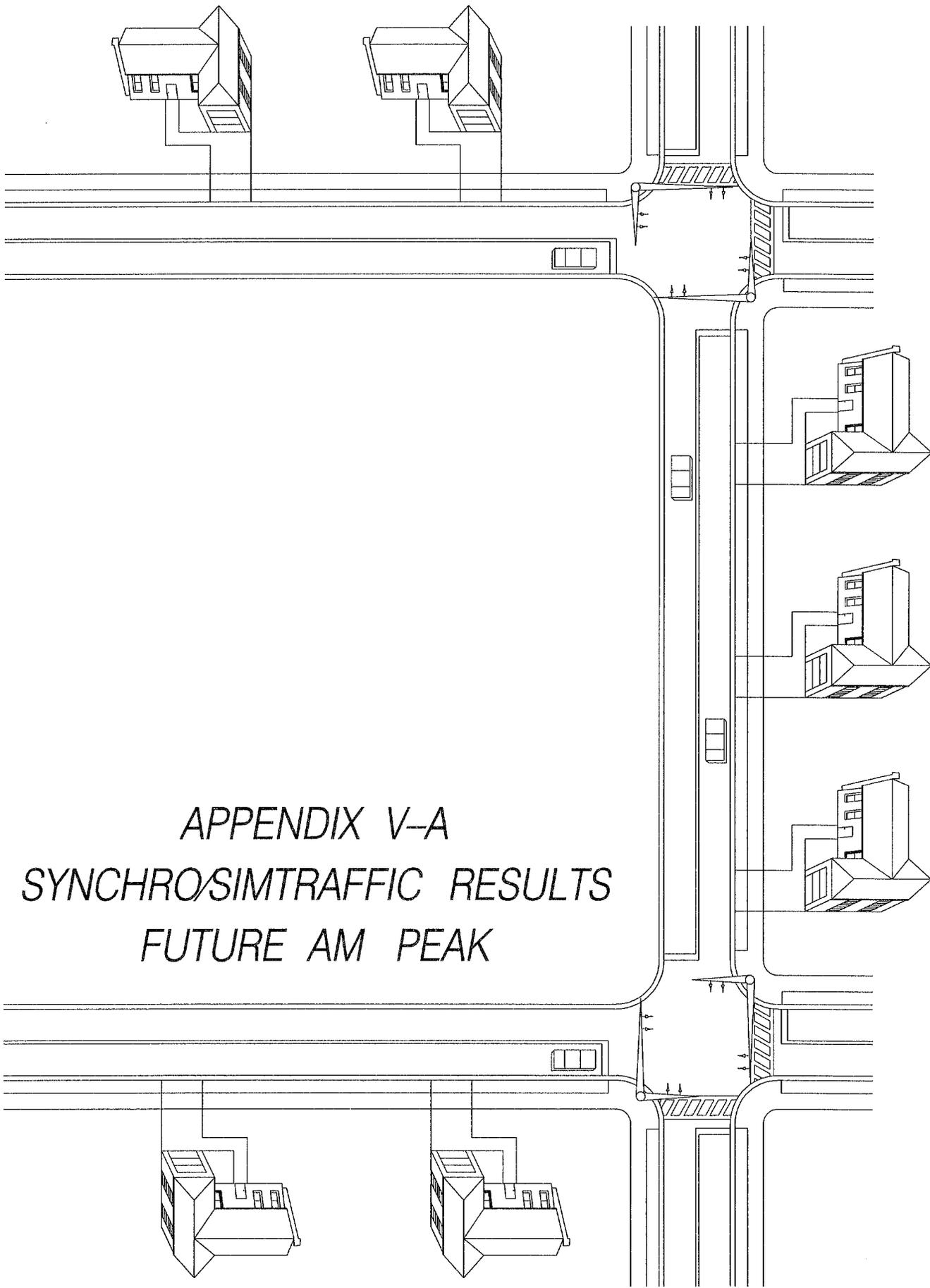
10/20/2017

Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	164	102	105	128	246	228	138	121	159	182
Average Queue (ft)	83	28	49	29	128	110	66	30	71	77
95th Queue (ft)	149	71	91	84	208	195	120	73	134	134
Link Distance (ft)		640	640		777	777		226	581	581
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)					4		2			
Queuing Penalty (veh)					2		1			

Zone Summary

Zone wide Queuing Penalty: 114



APPENDIX V-A
SYNCHRO/SIMTRAFFIC RESULTS
FUTURE AM PEAK

Future, AM

46: Bay Ridge Road & Georgetown Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	850	57	19	1354	19	35	0	12	16	0	288
Future Volume (vph)	163	850	57	19	1354	19	35	0	12	16	0	288
Satd. Flow (prot)	1787	3542	0	1787	3567	0	0	1752	0	0	1787	1599
Flt Permitted	0.095			0.291				0.964			0.950	
Satd. Flow (perm)	179	3542	0	547	3567	0	0	1752	0	0	1787	1599
Satd. Flow (RTOR)		9			1			132				55
Lane Group Flow (vph)	177	986	0	21	1493	0	0	51	0	0	17	313
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	1	6		5	2		4	4		8	8	1
Permitted Phases	6			2								8
Total Split (s)	27.0	92.0		11.0	76.0		11.0	11.0		26.0	26.0	27.0
Total Lost Time (s)	5.0	4.0		5.0	4.0			5.0			5.0	5.0
Act Effct Green (s)	121.3	116.5		96.4	91.6			5.5			7.0	31.0
Actuated g/C Ratio	0.87	0.83		0.69	0.65			0.04			0.05	0.22
v/c Ratio	0.39	0.33		0.05	0.64			0.26			0.19	0.79
Control Delay	6.5	3.9		4.0	9.2			3.2			68.1	55.3
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	6.5	3.9		4.0	9.3			3.2			68.1	55.3
LOS	A	A		A	A			A			E	E
Approach Delay		4.3			9.2			3.2			56.0	
Approach LOS		A			A			A			E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 4 (3%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.79

Intersection Signal Delay: 12.3

Intersection LOS: B

Intersection Capacity Utilization 70.9%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 46: Bay Ridge Road & Georgetown Road

27 s	76 s	11 s	26 s
11 s	92 s		

Future, AM
 Queuing and Blocking Report

10/20/2017

Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	78	396	404	175	788	806	265	472	225	226
Average Queue (ft)	6	221	217	8	711	721	203	282	135	119
95th Queue (ft)	47	346	351	73	932	933	305	422	208	199
Link Distance (ft)		1700	1700		766	766		620	541	541
Upstream Blk Time (%)					6	7				
Queuing Penalty (veh)					62	75				
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		4			40		7	56		
Queuing Penalty (veh)		0			5		20	78		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	149	109	100	44	362	357	112	64	252
Average Queue (ft)	70	18	21	7	141	143	47	24	114
95th Queue (ft)	128	60	65	29	279	291	97	57	210
Link Distance (ft)		1418	1418		1823	1823	366	629	629
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	1				1				
Queuing Penalty (veh)	5				0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	32	144	164	33	188	218	172	58
Average Queue (ft)	5	40	48	7	60	80	73	19
95th Queue (ft)	23	109	123	28	145	175	141	49
Link Distance (ft)		1823	1823		2842	2842	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		1		0	4			
Queuing Penalty (veh)		0		0	0			

Future, AM
 Queuing and Blocking Report

10/20/2017

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	B45
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	T
Maximum Queue (ft)	123	351	341	175	164	628	639	276	200	365	302	94
Average Queue (ft)	25	168	162	85	99	392	403	172	165	237	161	7
95th Queue (ft)	78	279	286	181	194	572	586	391	228	352	267	51
Link Distance (ft)		2842	2842			1203	1203			293	293	222
Upstream Blk Time (%)										5	1	0
Queuing Penalty (veh)										0	0	0
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		0	8	0	1	28	18	0	2	25		
Queuing Penalty (veh)		0	29	0	5	33	60	1	5	62		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	SB	SB	SB	B44	B44
Directions Served	L	L	TR	T	T
Maximum Queue (ft)	173	141	167	77	62
Average Queue (ft)	104	86	103	6	6
95th Queue (ft)	158	139	169	38	36
Link Distance (ft)	115	115	115	719	719
Upstream Blk Time (%)	9	5	12		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 46: Bay Ridge Road & Georgetown Road

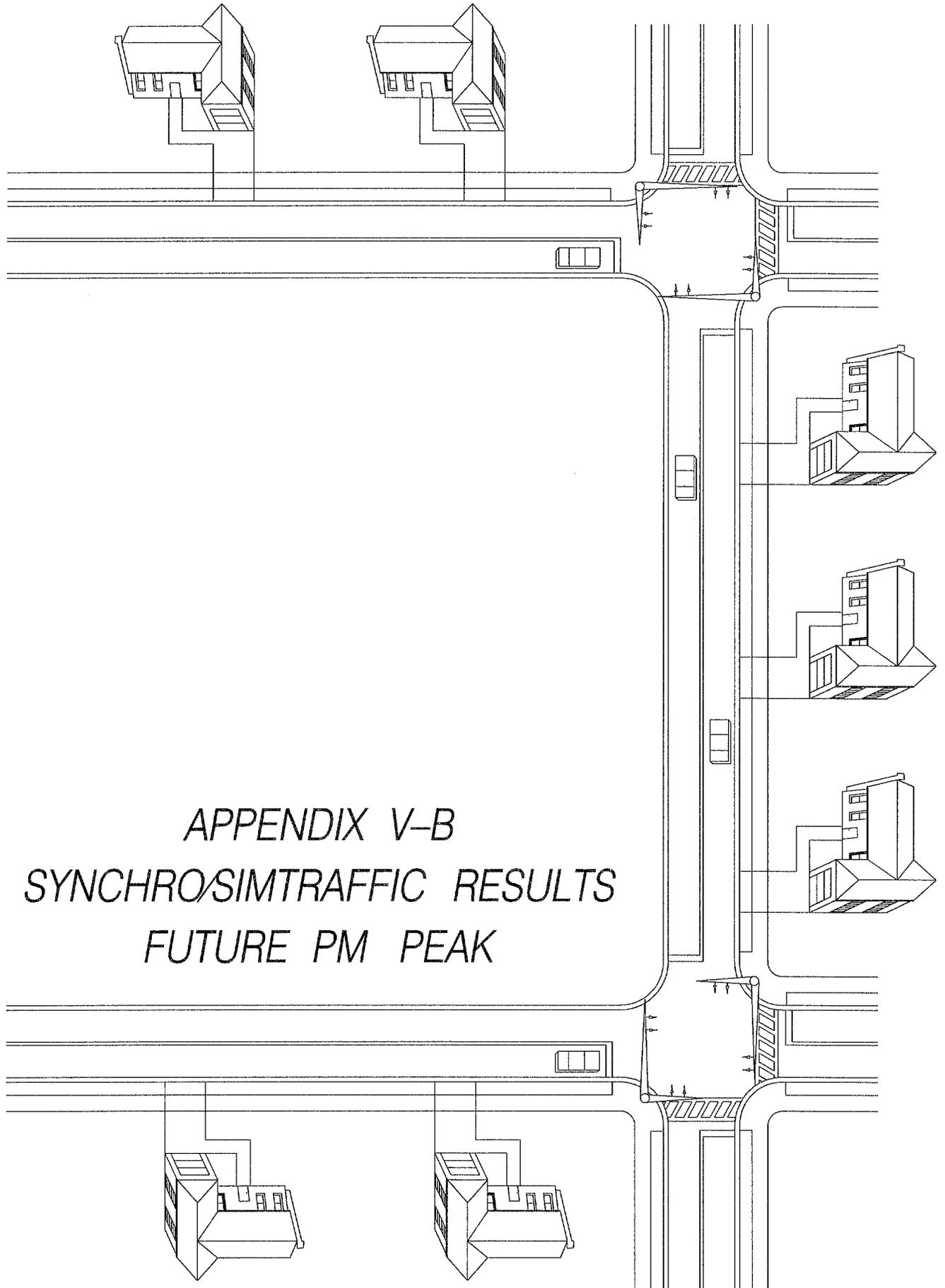
Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	159	104	131	36	254	283	140	58	264
Average Queue (ft)	70	15	17	8	108	119	59	18	136
95th Queue (ft)	130	63	75	28	197	221	122	49	232
Link Distance (ft)		1203	1203		645	645	153	722	722
Upstream Blk Time (%)							1		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	0				0				
Queuing Penalty (veh)	0				0				

Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	256	188	70	174	383	351	121	54	103	312
Average Queue (ft)	133	19	22	44	191	169	48	27	55	155
95th Queue (ft)	238	121	56	129	334	306	97	53	100	264
Link Distance (ft)		645	645		777	777		226	593	593
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)	2				14		0			
Queuing Penalty (veh)	5				9		0			

Zone Summary

Zone wide Queuing Penalty: 454



*APPENDIX V-B
SYNCHRO/SIMTRAFFIC RESULTS
FUTURE PM PEAK*



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	1181	372	152	946	329	335	125	125	428	143	38
Future Volume (vph)	41	1181	372	152	946	329	335	125	125	428	143	38
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1723	0	3433	1805	0
Flt Permitted	0.186			0.068			0.950			0.950		
Satd. Flow (perm)	346	3539	1583	127	3539	1583	3433	1723	0	3433	1805	0
Satd. Flow (RTOR)			198			342		31			8	
Lane Group Flow (vph)	45	1284	404	165	1028	358	364	272	0	465	196	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	1	6		5	2		8	8		7	7	
Permitted Phases	6		6	2		2						
Total Split (s)	12.0	68.0	68.0	12.0	68.0	68.0	30.0	30.0		30.0	30.0	
Total Lost Time (s)	5.0	4.0	4.0	5.0	4.0	5.0	5.0	5.0		5.0	5.0	
Act Effct Green (s)	69.8	64.1	64.1	75.9	70.4	69.4	23.2	23.2		22.9	22.9	
Actuated g/C Ratio	0.50	0.46	0.46	0.54	0.50	0.50	0.17	0.17		0.16	0.16	
v/c Ratio	0.19	0.79	0.49	0.85	0.58	0.37	0.64	0.87		0.83	0.65	
Control Delay	8.4	23.5	7.8	59.3	32.8	11.5	59.8	77.5		69.7	62.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.4	23.5	7.8	59.3	32.8	11.5	59.8	77.5		69.7	62.9	
LOS	A	C	A	E	C	B	E	E		E	E	
Approach Delay		19.4			30.7			67.4			67.7	
Approach LOS		B			C			E			E	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 100 (71%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 36.9

Intersection LOS: D

Intersection Capacity Utilization 83.3%

ICU Level of Service E

Analysis Period (min) 15

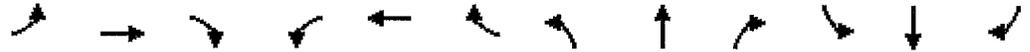
Splits and Phases: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Ø1	Ø2 (R)	Ø7	Ø8
12 s	68 s	30 s	30 s
Ø5	Ø6 (R)		
12 s	68 s		

Future, PM

49: Bay Ridge Road & Edgewood Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	422	912	50	33	597	71	47	25	34	135	10	412
Future Volume (vph)	422	912	50	33	597	71	47	25	34	135	10	412
Satd. Flow (prot)	1770	3511	0	1770	3483	0	0	1803	1583	0	1781	1583
Flt Permitted	0.259			0.274				0.968			0.956	
Satd. Flow (perm)	482	3511	0	510	3483	0	0	1803	1583	0	1781	1583
Satd. Flow (RTOR)		6			10				132			280
Lane Group Flow (vph)	459	1045	0	36	726	0	0	78	37	0	158	448
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	40.0	82.0		12.0	54.0		26.0	26.0	26.0	20.0	20.0	40.0
Total Lost Time (s)	5.0	4.0		5.0	4.0			5.0	5.0		5.0	5.0
Act Effect Green (s)	95.6	87.3		70.2	64.7			12.5	12.5		16.9	48.7
Actuated g/C Ratio	0.68	0.62		0.50	0.46			0.09	0.09		0.12	0.35
v/c Ratio	0.80	0.48		0.12	0.45			0.48	0.14		0.74	0.61
Control Delay	31.8	6.0		13.2	28.9			69.3	1.1		79.4	15.8
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	31.8	6.0		13.2	28.9			69.3	1.1		79.4	15.8
LOS	C	A		B	C			E	A		E	B
Approach Delay		13.9			28.2			47.4			32.4	
Approach LOS		B			C			D			C	

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 5 (4%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 22.6

Intersection LOS: C

Intersection Capacity Utilization 68.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road

Ø1 40 s	Ø2 (R) 54 s	Ø3 26 s	Ø4 20 s
Ø5 12 s	Ø6 (R) 82 s		

Future, PM
 Queuing and Blocking Report

10/20/2017

Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	66	1753	1755	122	401	424	264	421	282	277
Average Queue (ft)	4	1695	1694	44	193	209	153	229	160	141
95th Queue (ft)	43	1853	1862	131	347	376	271	356	242	230
Link Distance (ft)		1699	1699		769	769		621	587	587
Upstream Blk Time (%)		59	57							
Queuing Penalty (veh)		0	0							
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		45		0	8		2	38		
Queuing Penalty (veh)		3		0	1		5	37		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	156	205	234	58	211	212	158	125	136
Average Queue (ft)	68	76	88	17	76	74	70	49	63
95th Queue (ft)	130	177	189	46	155	154	130	101	116
Link Distance (ft)		1418	1418		1823	1823	415	636	636
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	1	1			0				
Queuing Penalty (veh)	5	2			0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	41	141	170	65	121	149	120	49
Average Queue (ft)	10	46	61	26	36	51	48	17
95th Queue (ft)	33	119	145	58	102	124	98	44
Link Distance (ft)		1823	1823		2844	2844	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		1		1	2			
Queuing Penalty (veh)		0		4	1			

Future, PM
 Queuing and Blocking Report

10/20/2017

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	B45
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	T
Maximum Queue (ft)	176	469	466	175	164	414	426	276	200	299	342	20
Average Queue (ft)	27	247	240	106	120	256	256	97	126	173	182	1
95th Queue (ft)	95	390	406	212	199	377	388	313	196	257	314	11
Link Distance (ft)		2844	2844			1203	1203			293	293	222
Upstream Blk Time (%)										0	3	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		3	16	0	7	18	7	0	1	10		
Queuing Penalty (veh)		1	60	2	33	28	22	0	1	17		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Road

Movement	SB	SB	SB	B44	B44
Directions Served	L	L	TR	T	T
Maximum Queue (ft)	182	168	171	421	97
Average Queue (ft)	151	123	123	142	15
95th Queue (ft)	195	179	192	361	64
Link Distance (ft)	115	115	115	719	719
Upstream Blk Time (%)	40	26	22		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 46: Bay Ridge Road & Georgetown Road

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	214	414	171	125	294	299	179	54	263
Average Queue (ft)	146	69	32	26	119	140	159	16	123
95th Queue (ft)	234	265	98	77	224	242	199	45	217
Link Distance (ft)		1203	1203		638	638	153	722	722
Upstream Blk Time (%)							68		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	8				0				
Queuing Penalty (veh)	41				0				

Future, PM
 Queuing and Blocking Report

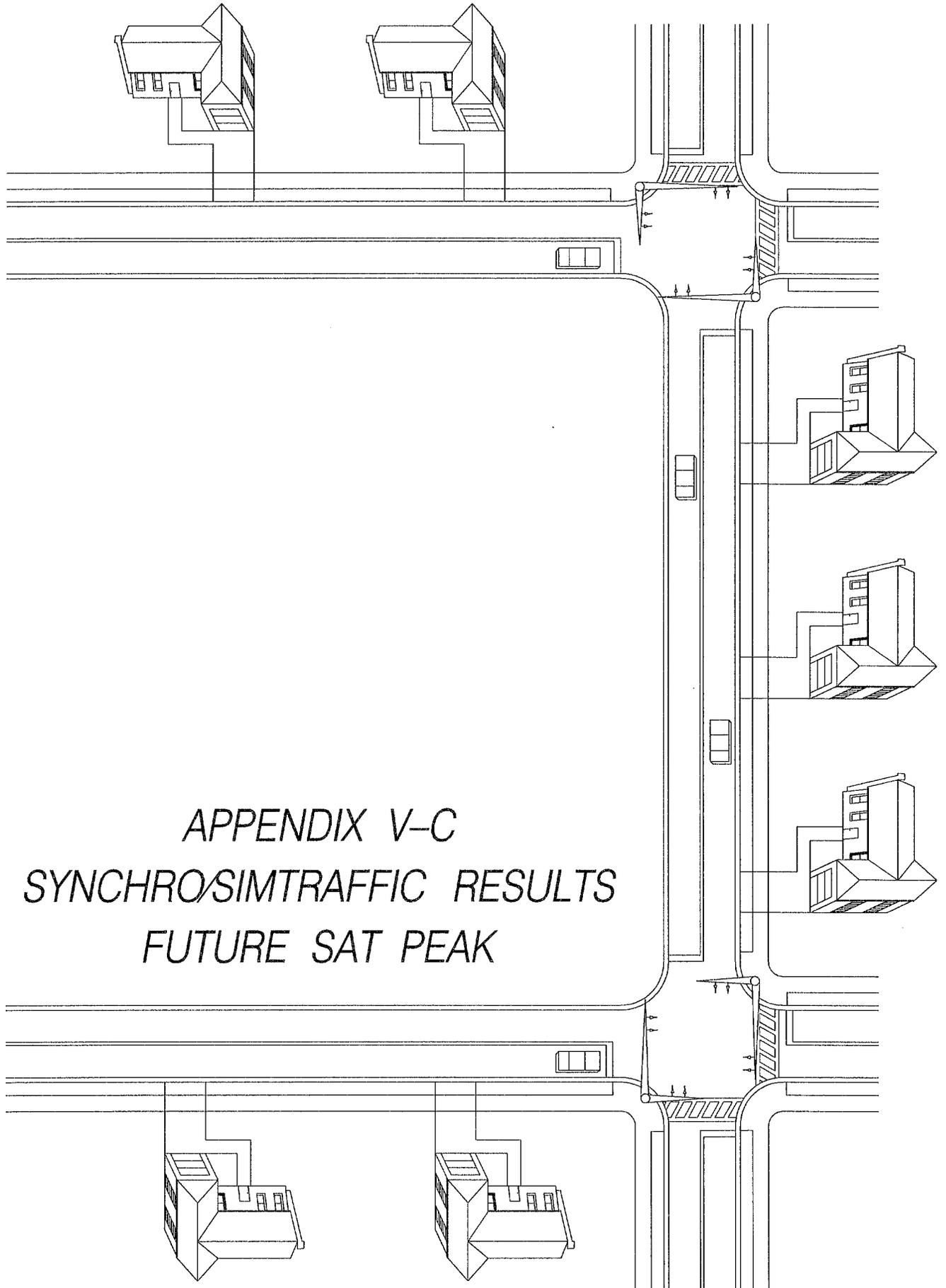
10/20/2017

Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	264	326	223	172	278	256	134	62	241	276
Average Queue (ft)	143	89	89	29	156	132	57	24	122	110
95th Queue (ft)	239	207	166	91	254	236	114	53	206	207
Link Distance (ft)		638	638		777	777		226	579	579
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)	2				9		2			
Queuing Penalty (veh)	11				3		1			

Zone Summary

Zone wide Queuing Penalty: 275



APPENDIX V-C
SYNCHRO/SIMTRAFFIC RESULTS
FUTURE SAT PEAK



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	1504	49	39	1517	4	40	0	35	1	0	20
Future Volume (vph)	10	1504	49	39	1517	4	40	0	35	1	0	20
Satd. Flow (prot)	1770	3522	0	1770	3539	0	0	1700	0	0	1619	0
Flt Permitted	0.128			0.107				0.821			0.983	
Satd. Flow (perm)	238	3522	0	199	3539	0	0	1433	0	0	1595	0
Satd. Flow (RTOR)		5						64			64	
Lane Group Flow (vph)	11	1688	0	42	1653	0	0	81	0	0	23	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Total Split (s)	11.0	83.0		11.0	83.0		26.0	26.0		26.0	26.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Act Effect Green (s)	99.9	96.4		103.4	103.1			7.8			7.8	
Actuated g/C Ratio	0.83	0.80		0.86	0.86			0.06			0.06	
v/c Ratio	0.04	0.60		0.17	0.54			0.53			0.14	
Control Delay	3.4	9.1		2.2	3.6			30.6			1.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay	3.4	9.1		2.2	3.6			30.6			1.8	
LOS	A	A		A	A			C			A	
Approach Delay		9.1			3.5			30.6			1.8	
Approach LOS		A			A			C			A	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 9 (8%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 6.8

Intersection LOS: A

Intersection Capacity Utilization 62.5%

ICU Level of Service B

Analysis Period (min) 15

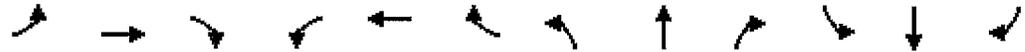
Splits and Phases: 40: Annapolis Neck Road/Martha Court & Forest Drive

Ø1	Ø2 (R)	Ø4
11 s	83 s	26 s
Ø5	Ø6 (R)	Ø8
11 s	83 s	26 s

Future, Saturday

43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	829	292	100	979	286	366	104	125	351	125	45
Future Volume (vph)	42	829	292	100	979	286	366	104	125	351	125	45
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	3433	1710	0	3433	1788	0
Flt Permitted	0.165			0.190			0.950		0.950			
Satd. Flow (perm)	307	3539	1583	354	3539	1583	3433	1710	0	3433	1788	0
Satd. Flow (RTOR)			219			302		45			13	
Lane Group Flow (vph)	46	901	317	109	1064	311	398	249	0	382	185	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Split	NA		Split	NA	
Protected Phases	1	6		5	2		8	8		7	7	
Permitted Phases	6		6	2		2						
Total Split (s)	12.0	48.0	48.0	16.0	52.0	52.0	28.0	28.0		28.0	28.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Act Effect Green (s)	59.6	52.8	52.8	64.8	57.1	57.1	19.7	19.7		18.5	18.5	
Actuated g/C Ratio	0.50	0.44	0.44	0.54	0.48	0.48	0.16	0.16		0.15	0.15	
v/c Ratio	0.20	0.58	0.39	0.37	0.63	0.34	0.71	0.78		0.72	0.64	
Control Delay	8.2	18.0	7.9	17.1	31.0	10.3	54.4	56.4		56.1	54.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.2	18.0	7.9	17.1	31.0	10.3	54.4	56.4		56.1	54.5	
LOS	A	B	A	B	C	B	D	E		E	D	
Approach Delay		15.1			25.6			55.1			55.6	
Approach LOS		B			C			E			E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 90 (75%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.78

Intersection Signal Delay: 31.4

Intersection LOS: C

Intersection Capacity Utilization 70.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

Ø1 12 s	Ø2 (R) 52 s	Ø7 28 s	Ø8 28 s
Ø5 16 s	Ø6 (R) 48 s		

Future, Saturday

46: Bay Ridge Road & Georgetown Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	336	841	140	56	872	31	114	0	75	24	0	319
Future Volume (vph)	336	841	140	56	872	31	114	0	75	24	0	319
Satd. Flow (prot)	1770	3465	0	1770	3522	0	0	1711	0	0	1770	1583
Flt Permitted	0.181			0.268				0.971			0.950	
Satd. Flow (perm)	337	3465	0	499	3522	0	0	1711	0	0	1770	1583
Satd. Flow (RTOR)		23			3			155				67
Lane Group Flow (vph)	365	1066	0	61	982	0	0	206	0	0	26	347
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	1	6		5	2		4	4		8	8	1
Permitted Phases	6			2								8
Total Split (s)	32.0	66.0		11.0	45.0		17.0	17.0		26.0	26.0	32.0
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Act Effct Green (s)	90.7	81.6		67.5	61.3			9.0			9.7	34.7
Actuated g/C Ratio	0.76	0.68		0.56	0.51			0.08			0.08	0.29
v/c Ratio	0.67	0.45		0.18	0.55			0.76			0.18	0.69
Control Delay	16.0	5.9		9.1	17.6			33.7			51.3	35.4
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	0.0
Total Delay	16.0	5.9		9.1	17.6			33.7			51.3	35.4
LOS	B	A		A	B			C			D	D
Approach Delay		8.5			17.1			33.7			36.5	
Approach LOS		A			B			C			D	

Intersection Summary

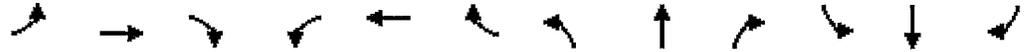
Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 16.5
 Intersection LOS: B
 Intersection Capacity Utilization 73.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 46: Bay Ridge Road & Georgetown Road

Ø1 32 s	Ø2 (R) 45 s	Ø4 17 s	Ø8 26 s
Ø5 11 s	Ø6 (R) 66 s		

Future, Saturday
 49: Bay Ridge Road & Edgewood Road

10/20/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	505	71	57	594	59	64	25	50	80	19	347
Future Volume (vph)	287	505	71	57	594	59	64	25	50	80	19	347
Satd. Flow (prot)	1770	3476	0	1770	3490	0	0	1798	1583	0	1790	1583
Flt Permitted	0.284			0.414				0.965			0.961	
Satd. Flow (perm)	529	3476	0	771	3490	0	0	1798	1583	0	1790	1583
Satd. Flow (RTOR)		18			9				155			280
Lane Group Flow (vph)	312	626	0	62	710	0	0	97	54	0	108	377
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	pm+ov
Protected Phases	1	6		5	2		3	3		4	4	1
Permitted Phases	6			2					3			4
Total Split (s)	36.0	64.0		12.0	40.0		26.0	26.0	26.0	18.0	18.0	36.0
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	5.0
Act Effct Green (s)	80.4	70.8		65.0	58.2			12.8	12.8		11.7	33.9
Actuated g/C Ratio	0.67	0.59		0.54	0.48			0.11	0.11		0.10	0.28
v/c Ratio	0.59	0.30		0.13	0.42			0.51	0.18		0.62	0.58
Control Delay	16.0	3.6		10.8	23.4			58.5	1.2		67.2	12.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	16.0	3.6		10.8	23.4			58.5	1.2		67.2	12.2
LOS	B	A		B	C			E	A		E	B
Approach Delay		7.8			22.4			38.0			24.5	
Approach LOS		A			C			D			C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 15 (13%), Referenced to phase 2:WBTL and 6:EBTL, Start of 1st Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 18.0

Intersection LOS: B

Intersection Capacity Utilization 58.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 49: Bay Ridge Road & Edgewood Road

Ø1 36 s	Ø2 (R) 40 s	Ø3 26 s	Ø4 18 s
Ø5 12 s	Ø6 (R) 64 s		

Future, Saturday
 Queuing and Blocking Report

10/25/2017

Intersection: 18: Spa Road & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	LTR	L	LTR
Maximum Queue (ft)	168	758	741	125	467	495	195	286	178	172
Average Queue (ft)	12	393	389	36	184	194	58	145	95	74
95th Queue (ft)	94	708	698	121	379	399	169	231	157	140
Link Distance (ft)		1699	1699		764	764		616	587	587
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	250			195			140			
Storage Blk Time (%)		23		4	9		0	10		
Queuing Penalty (veh)		2		33	1		0	8		

Intersection: 37: Tyler Avenue & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	133	203	208	45	316	317	117	99	97
Average Queue (ft)	53	103	115	9	160	171	44	36	40
95th Queue (ft)	103	188	191	33	265	271	91	82	80
Link Distance (ft)		1417	1417		1822	1822	415	636	636
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	150			250					
Storage Blk Time (%)	0	1			2				
Queuing Penalty (veh)	1	1			0				

Intersection: 40: Annapolis Neck Road/Martha Court & Forest Drive

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	60	250	274	62	108	120	146	51
Average Queue (ft)	7	85	98	22	23	30	53	16
95th Queue (ft)	35	203	224	51	74	92	106	44
Link Distance (ft)		1822	1822		2845	2845	276	370
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	105			65				
Storage Blk Time (%)		3		0	1			
Queuing Penalty (veh)		0		3	0			

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Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	B45
Directions Served	L	T	T	R	L	T	T	R	L	L	TR	T
Maximum Queue (ft)	130	318	368	175	164	366	387	276	198	287	262	7
Average Queue (ft)	32	192	184	113	94	227	234	75	119	157	128	0
95th Queue (ft)	85	288	303	216	193	340	364	277	193	238	224	5
Link Distance (ft)		2845	2845			1203	1203			292	292	222
Upstream Blk Time (%)										0	0	
Queuing Penalty (veh)										0	0	
Storage Bay Dist (ft)	320			150	140			251	175			
Storage Blk Time (%)		0	12	0	0	19	5	0	0	6		
Queuing Penalty (veh)		0	35	0	1	19	15	0	0	11		

Intersection: 43: Hillsmere Drive/Bay Ridge Avenue & Forest Drive/Bay Ridge Rd.

Movement	SB	SB	SB	B44	B44
Directions Served	L	L	TR	T	T
Maximum Queue (ft)	178	164	170	138	81
Average Queue (ft)	129	101	115	17	9
95th Queue (ft)	187	152	180	75	46
Link Distance (ft)	116	116	116	719	719
Upstream Blk Time (%)	17	7	15		
Queuing Penalty (veh)	0	0	0		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 46: Bay Ridge Road & Georgetown Road

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LT	R
Maximum Queue (ft)	214	306	246	65	274	297	193	85	230
Average Queue (ft)	116	62	65	24	141	157	146	22	102
95th Queue (ft)	203	185	159	51	234	255	207	60	188
Link Distance (ft)		1203	1203		640	640	153	722	722
Upstream Blk Time (%)							46		
Queuing Penalty (veh)							0		
Storage Bay Dist (ft)	190			300					
Storage Blk Time (%)	4	0			0				
Queuing Penalty (veh)	15	0			0				

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Intersection: 49: Bay Ridge Road & Edgewood Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LT	R
Maximum Queue (ft)	196	96	115	140	253	235	142	114	179	199
Average Queue (ft)	97	32	49	32	135	116	66	31	71	83
95th Queue (ft)	173	74	92	89	216	201	123	77	139	143
Link Distance (ft)		640	640		777	777		226	581	581
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	240			150			125			
Storage Blk Time (%)	0				5		2			
Queuing Penalty (veh)	0				3		1			

Zone Summary

Zone wide Queuing Penalty: 151