Appendix D
CCNPP Employee Demographics

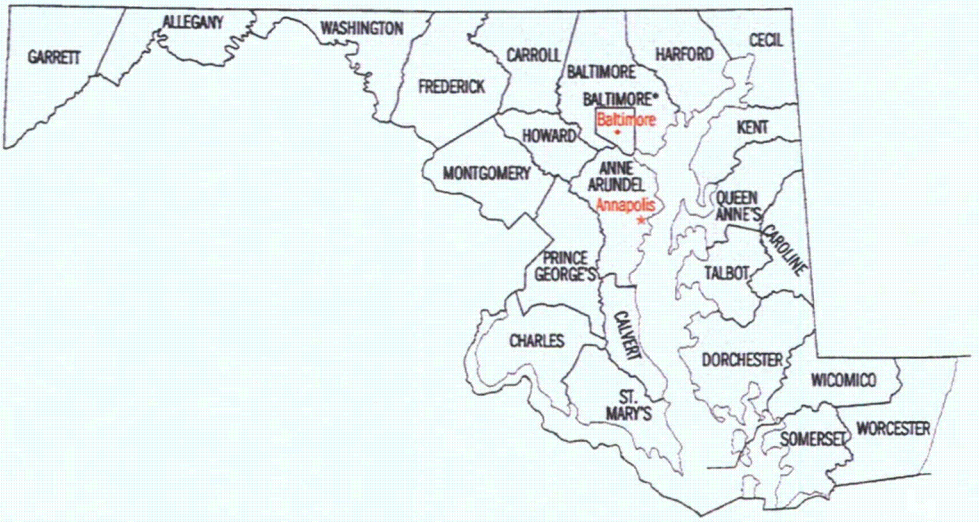


Figure D1 – Maryland County Map

Table D1– Power Plant Employees Including Contractors – By County

		Site Approach	
# Employees	***Origin County***	***NB MD 2/4***	***SB MD 2/4***
27	Anne Arundel		27
4	Baltimore		4
562	Calvert	281	281
2	Howard		2
6	Prince Georges		6
1	Alleghany		1
30	Charles		30
198	St Mary	139	59
1	Washington		1
2	Out of State		2
833		420	412
Overall %		**50.4%**	**49.6%**

Table D2– Power Plant Employees Only – By County

# Employees	Origin County	Site Approach	
		NB MD 2/4	SB MD 2/4
24	Anne Arundel		24
3	Baltimore		3
523	Calvert	262	262
2	Howard		2
4	Prince Georges		4
1	Alleghany		1
29	Charles		29
186	St Mary	130	56
1	Washington		1
2	Out of State		2
775		392	382
Overall %		**50.6%**	**49.4%**

Appendix E
Construction Material Shipments

Civil Material			
Construction Equipment	500 on+500 off	1,000	shipments
Concrete Material	848,355 tons / 15 tons per shipment	56,557	shipments
Formwork	2393 tons/15 tons per shipment	160	shipments
Rebar	55,331 tons/15 tons per shipment	3,689	shipments
Structural Steel	6,261 tons/15 tons per shipment	418	shipments
Misc. Steel	1,016 tons/15 tons per shipment	68	shipments
Mod Steel	225 tons/15 tons per shipment	15	shipments
Steel Liner	1,412 tons/15 tons per shipment	94	shipments
Embedded Steel	1903 tons/15 tons per shipment	127	shipments
Siding & Roofing	2056 tons/15 tons per shipment	137	shipments
Pre engineered building	60 tons/15 tons per shipment	4	shipments
Construction Debris	12,000 tons/15 tons per shipment	800	shipments
Piping and Mechanical Material			
Large and Small bore pipe	7500 tons/15 tons per shipment	500	shipments
Large bore hangers	2788 tons/15 tons per shipment	186	shipments
Nuclear Island EM package Equipment	15,377 tons/15 tons per shipment	1,025	shipments
Turbine Island and BOP Mechanical Equipment		1,000	shipments
Consumables		1,000	shipments
Electrical Equipment			
Conduit	1,356 tons/15 tons per shipment	90	shipments
Cable Tray	73 tons/15 tons per shipment	49	shipments
Power & Control wire	4,406 tons/15 tons per shipment	294	shipments
NI Electrical Equipment	5,000 ton/15 tons per shipment	333	shipments
TI Electrical Equipment	5,000 ton/15 tons per shipment	333	shipments
Grand Total		67,879	shipments

Appendix F
Journey to Work Census Data

Vehicle Occupancy by Profession

Construction Workers Automobile Usage

From the Journey-To-Work Census Data (2000)

CTPP 2000: Part 2 Table 9: Occupation by Means of transportation to work – For the state of Maryland

TAB9X221	All workers; having Construction and excavation occupations; For All 11 Categories of Means of transportation to work	122925	
TAB9X222	All workers; having Construction and excavation occupations; who drove alone	81790	
TAB9X223	All workers; having Construction and excavation occupations; who travel to work by 2-person carpool	21920	
TAB9X224	All workers; having Construction and excavation occupations; who travel to work by 3-person carpool	6130	
TAB9X225	All workers; having Construction and excavation occupations; who travel to work by 4-or-more-person carpool	3945	
TAB9X226	All workers; having Construction and excavation occupations; who travel to work by Bus or trolley bus	3285	
TAB9X227	All workers; having Construction and excavation occupations; who travel to work by Streetcar, trolley car, subway, or elevated	670	
TAB9X228	All workers; having Construction and excavation occupations; who travel to work by Railroad or ferryboat	90	
TAB9X229	All workers; having Construction and excavation occupations; who travel to work by Bicycle or walked	2050	
TAB9X230	All workers; having Construction and excavation occupations; who travel to work by Taxicab, motorcycle or other means	1595	
TAB9X231	All workers; having Construction and excavation occupations; who worked at home	1455	

(Data Source: http://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=1344&DB_Short_Name=CTPP%202000)

Based on the table above, considering the automobile mode of travel

	Workers	Vehicle Occupancy	Vehicles
	81790	1	81790
	21920	2	10960
	6130	3	2043
	3945	4	986
Total	113785		95779

Average Vehicle Occupancy = No.OfWorkers/No.OfVehicles = 113785/95779 = ***1.19***

Appendix G
Projected Conditions During Construction

LOS Analysis Worksheets

This appendix contains the following:

The CLV calculations are summarized in Table G-1. Figure G-1 presents the traffic volumes and turning movements at the study intersections during the AM and PM peak hours. Figure G-2 shows added construction traffic only.

Table G- 1 – Intersection LOS: Construction Peak (2016) Conditions

Intersection	*CLV*		*LOS*	
	AM	*PM*	*AM*	*PM*
MD 2/MD 4 diverge	**1879**	**1946**	**F**	**F**
MD 231 & MD 2/MD 4	1331	**1640**	D	**F**
Calvert Beach/Ball Road & MD 2/MD 4	**1764**	**1757**	**F**	**F**
Calvert Cliffs Parkway & MD 2/MD 4	888	**1546**	A	**E**
White Sands Drive & MD 2/MD 4	782	1400	A	D
Nursery Road & MD 2/MD 4	1008	1268	B	C
Pardoe Road & MD 2/MD 4	1162	1261	C	C
Cove Point Road & MD 2/MD 4	997	1329	A	D

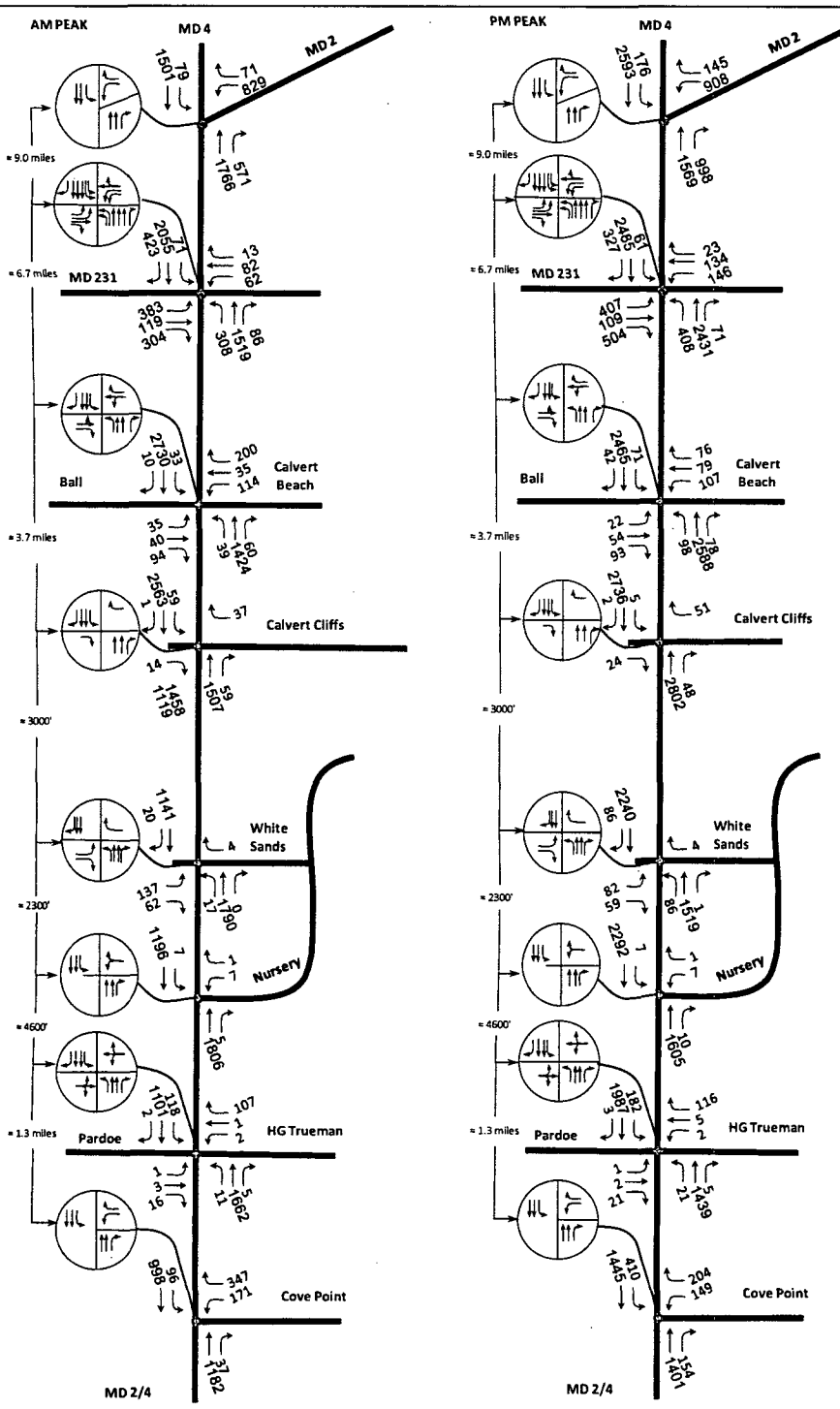


Figure G-1 – Peak Hour Traffic for Conditions During Construction

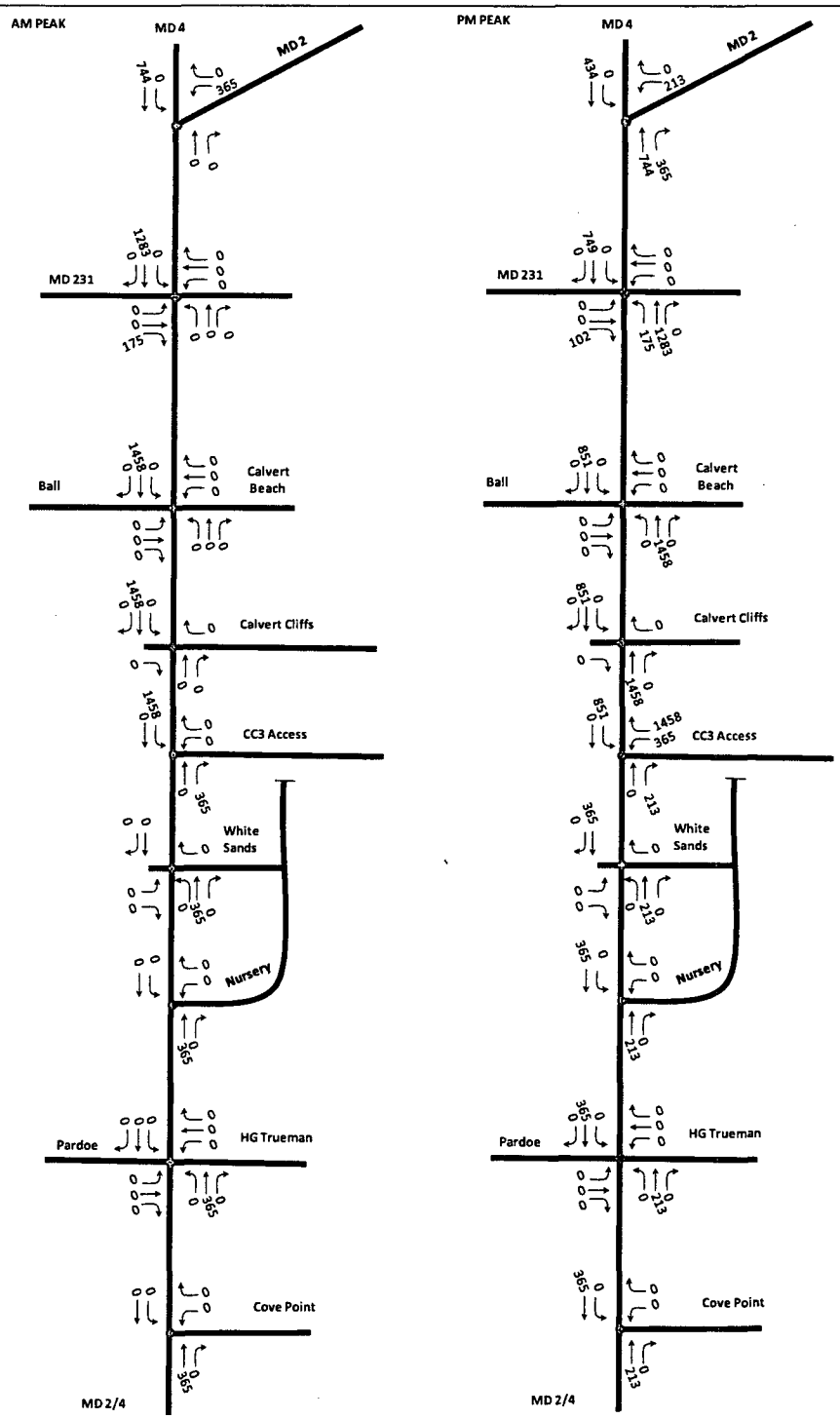
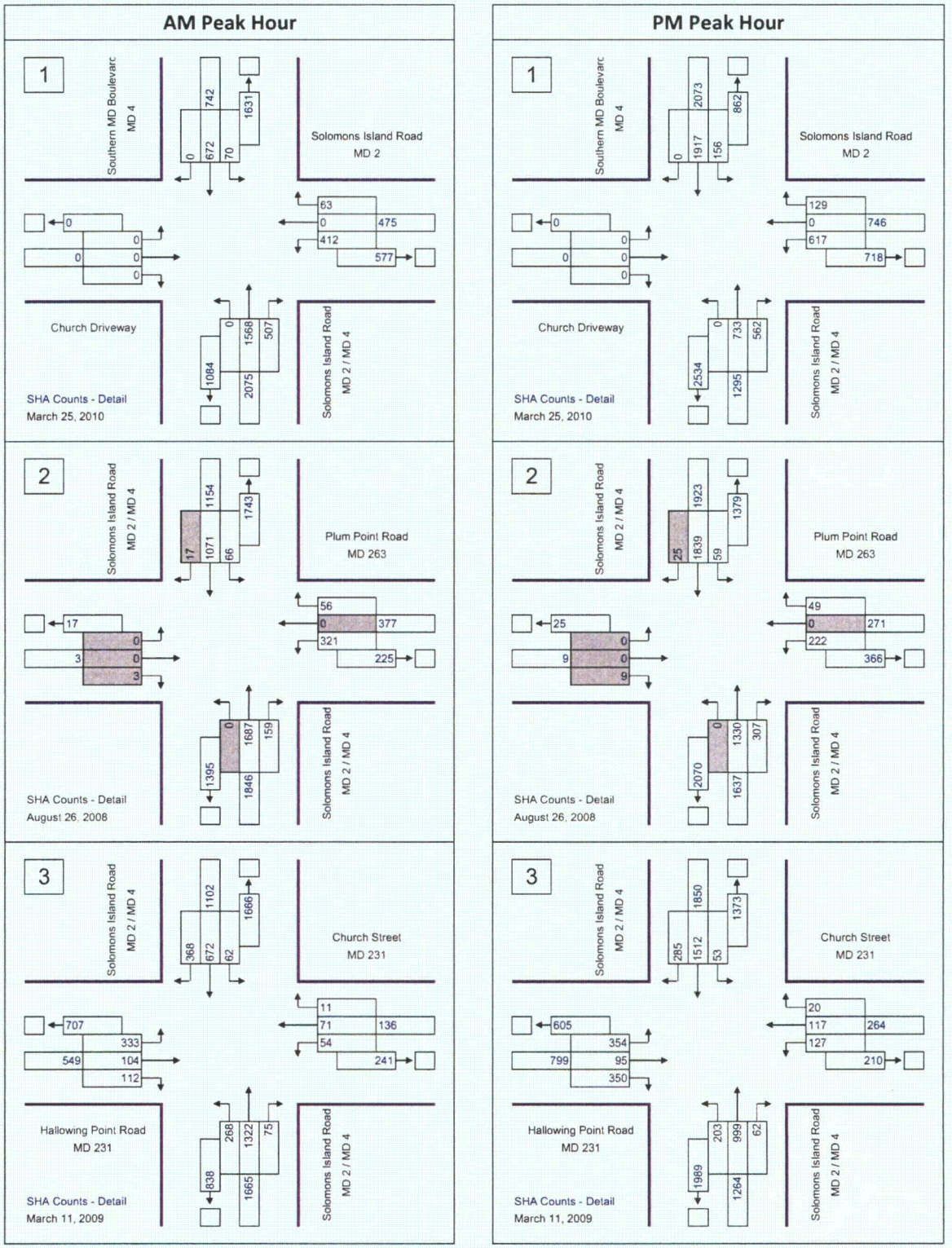
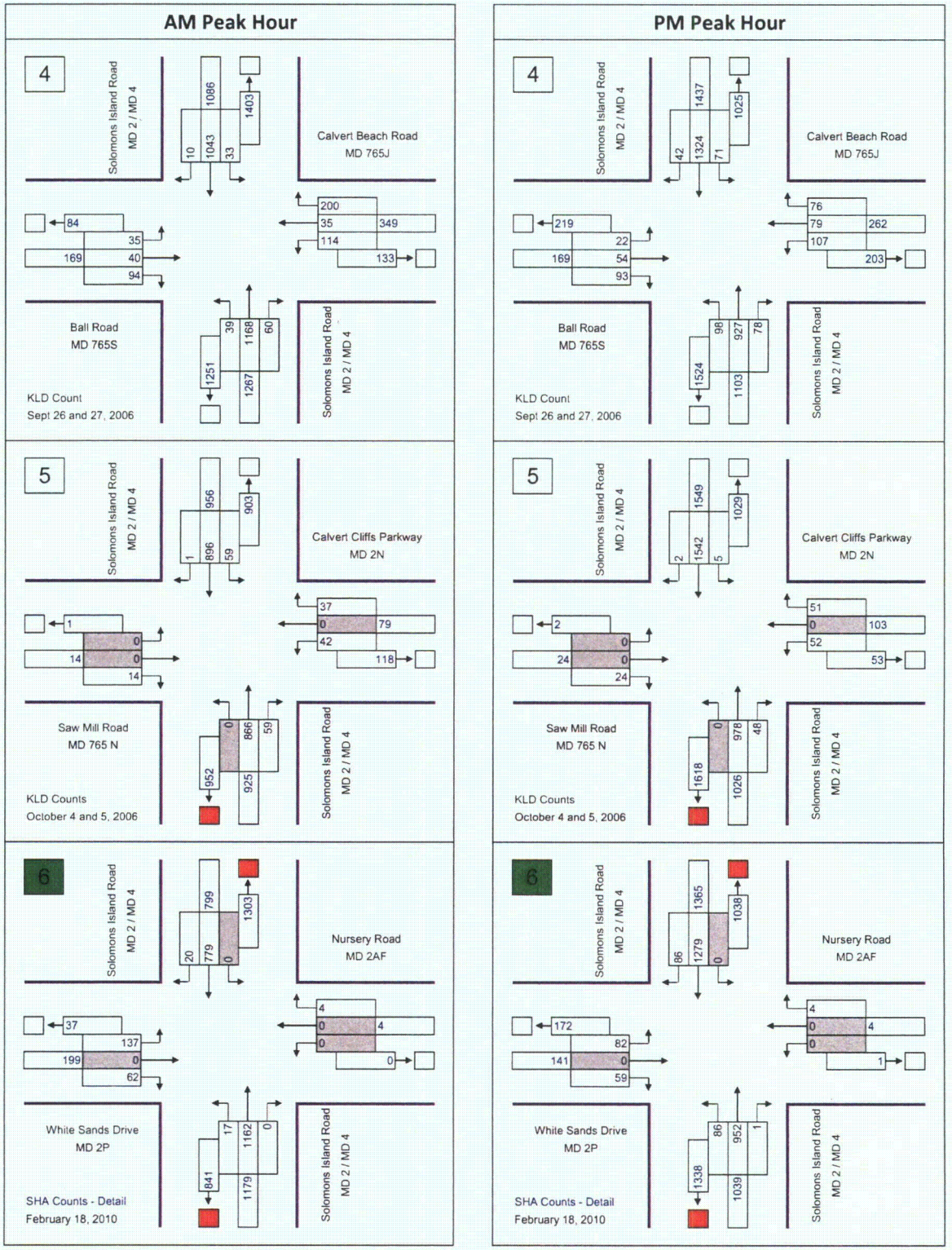
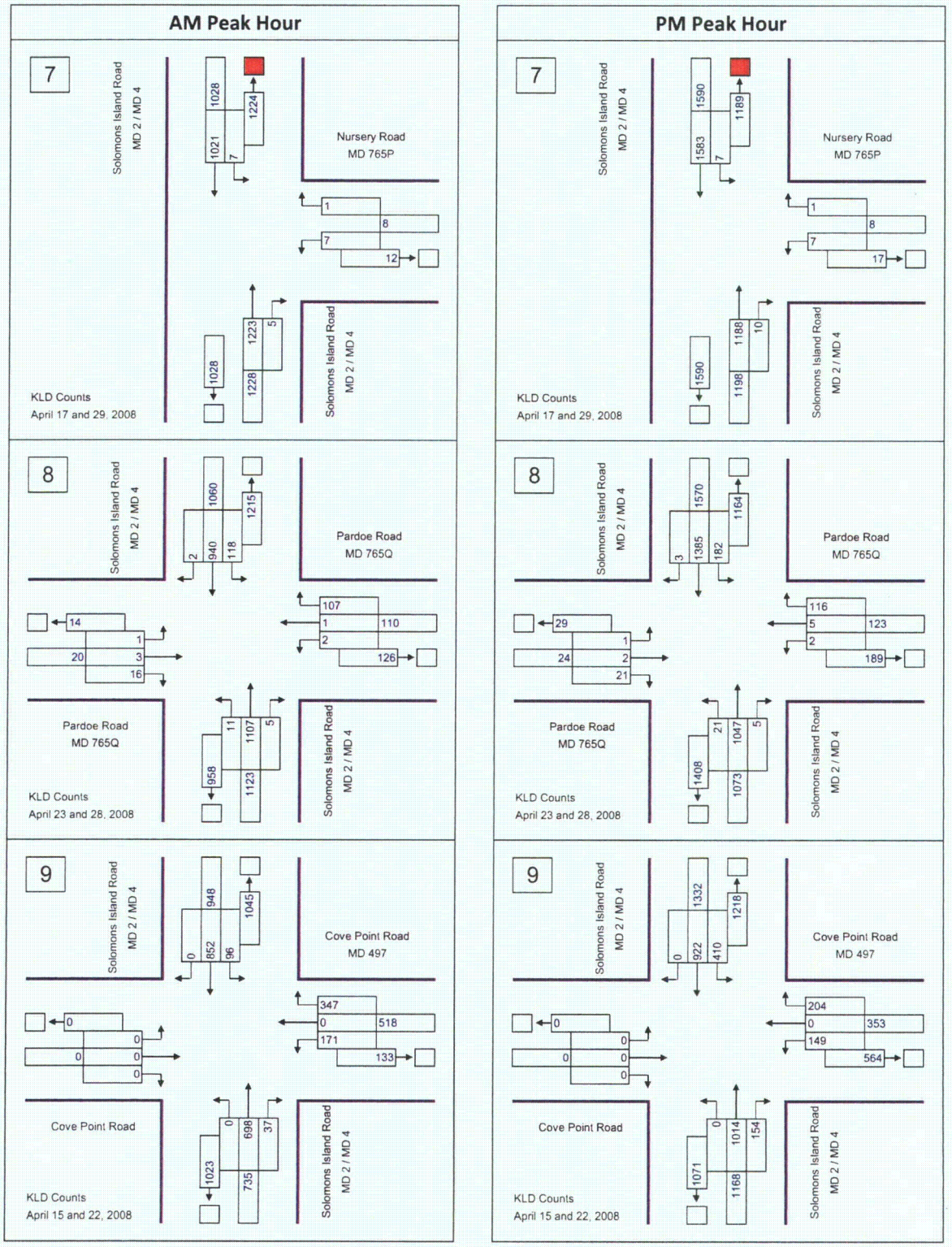


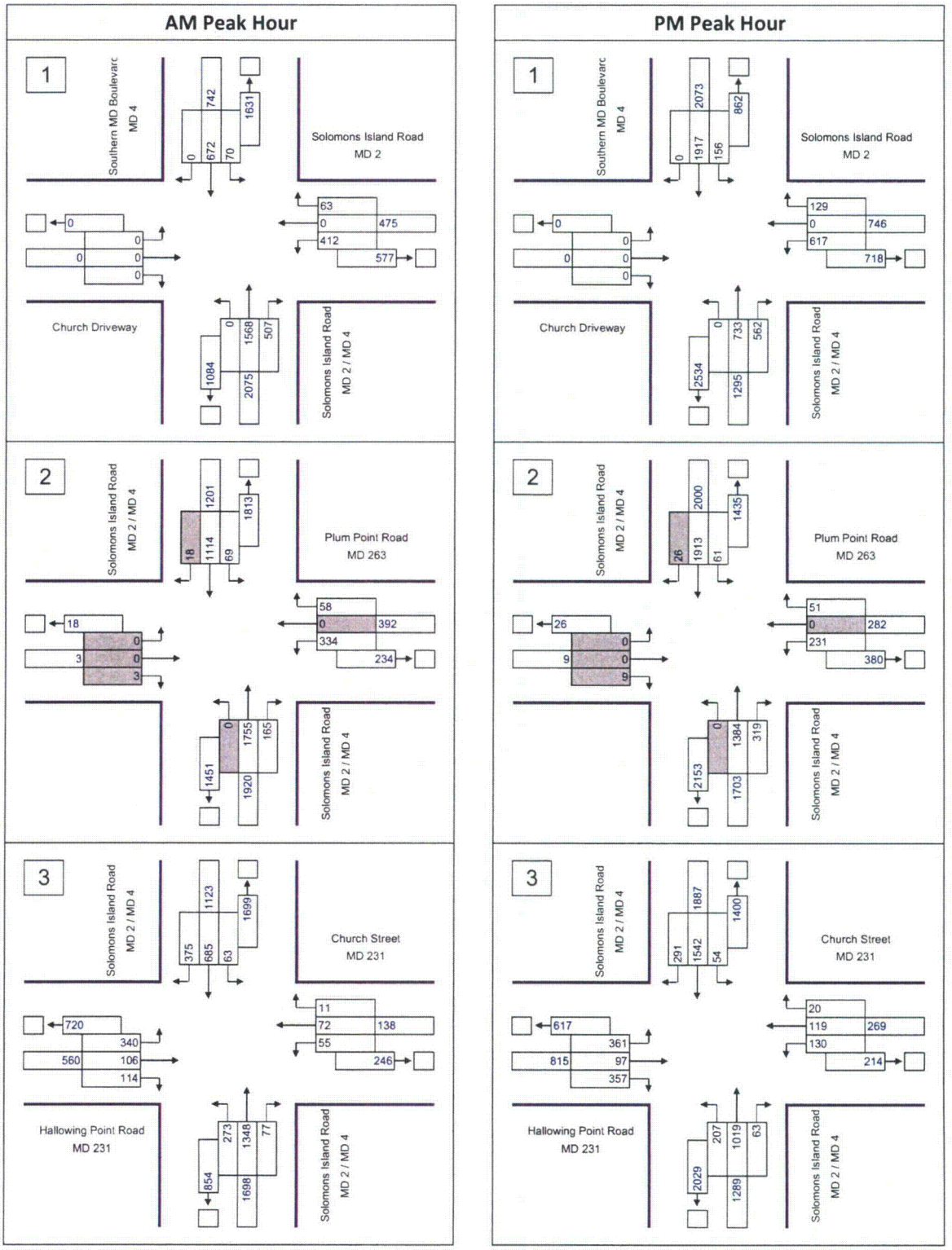
Figure G-2 – Peak Hour Volumes – Additional Construction Traffic Only

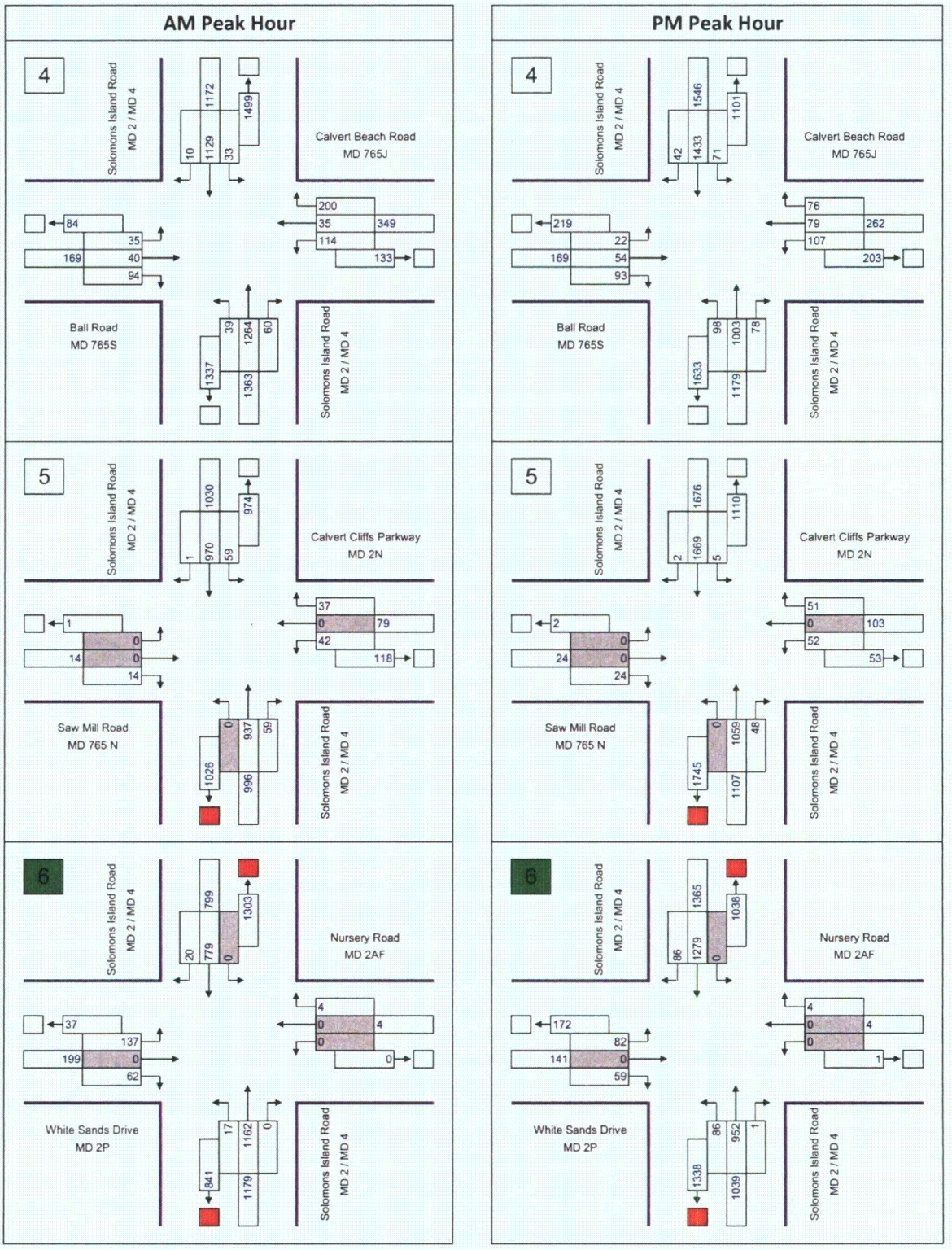

AM Peak Hour
1
Southern MD Boulevard
MD 4
Solomons Island Road
MD 2
Church Driveway
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
March 25, 2010
2
Solomons Island Road
MD 2 / MD 4
Plum Point Road
MD 263
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
August 26, 2008
3
Solomons Island Road
MD 2 / MD 4
Church Street
MD 231
Hallowing Point Road
MD 231
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
March 11, 2009
PM Peak Hour
1
Southern MD Boulevard
MD 4
Solomons Island Road
MD 2
Church Driveway
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
March 25, 2010
2
Solomons Island Road
MD 2 / MD 4
Plum Point Road
MD 263
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
August 26, 2008
3
Solomons Island Road
MD 2 / MD 4
Church Street
MD 231
Hallowing Point Road
MD 231
Solomons Island Road
MD 2 / MD 4
SHA Counts - Detail
March 11, 2009

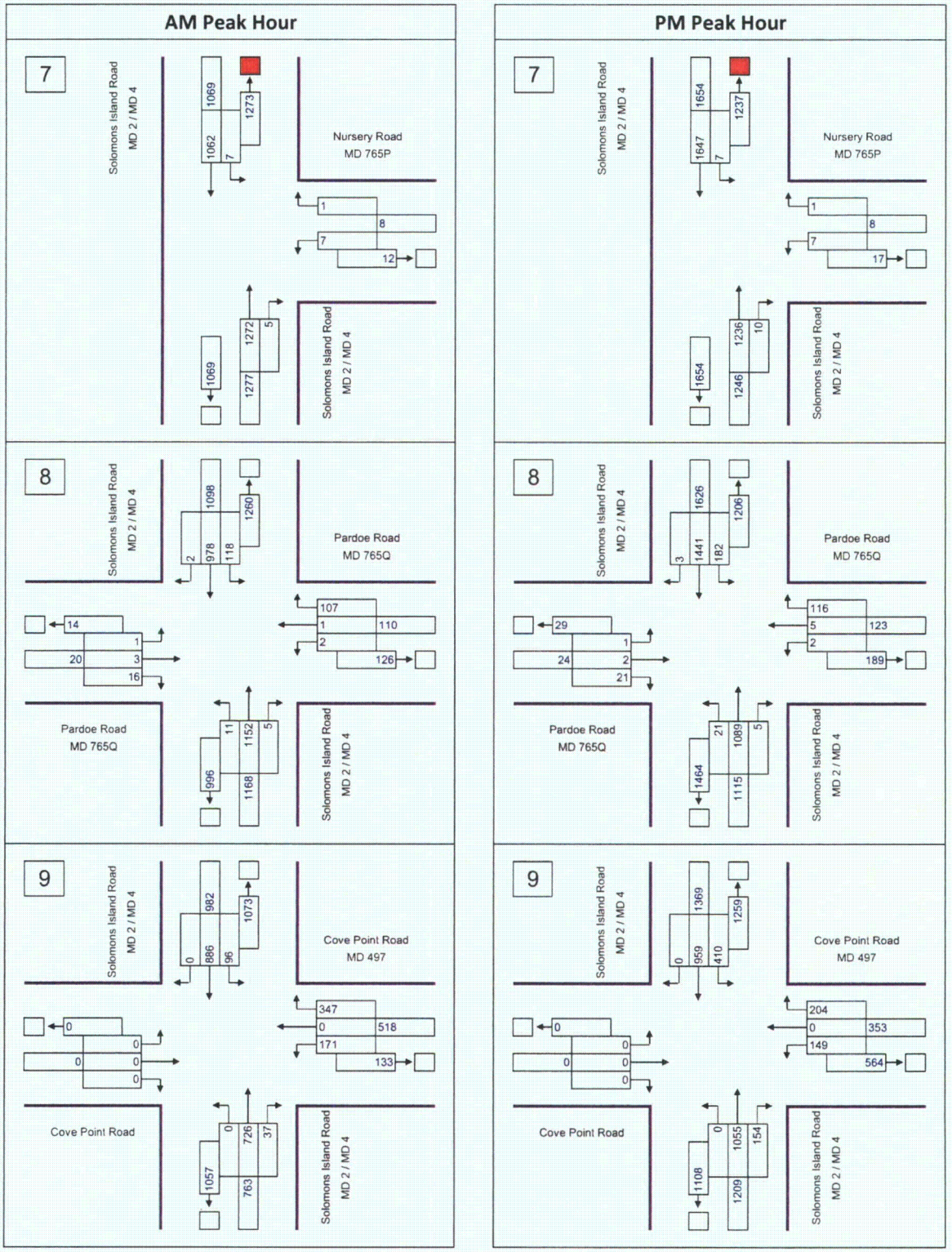
Count Data


AM Peak Hour
4
Solomons Island Road
MD 2 / MD 4
Calvert Beach Road
MD 765J
Ball Road
MD 765S
KLD Count
Sept 26 and 27, 2006
5
Calvert Cliffs Parkway
MD 2N
Saw Mill Road
MD 765 N
KLD Counts
October 4 and 5, 2006
6
Nursery Road
MD 2AF
White Sands Drive
MD 2P
SHA Counts - Detail
February 18, 2010
PM Peak Hour


AM Peak Hour
7
Solomons Island Road
MD 2 / MD 4
1028
1021
7
1224
Nursery Road
MD 765P
1
8
7
12
1028
1223
5
1228
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 17 and 29, 2008
8
Solomons Island Road
MD 2 / MD 4
1060
2
940
118
1215
Pardoe Road
MD 765Q
14
1
20
3
16
107
1
110
2
126
Pardoe Road
MD 765Q
11
1107
5
958
1123
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 23 and 28, 2008
9
Solomons Island Road
MD 2 / MD 4
948
0
852
96
1045
Cove Point Road
MD 497
0
0
0
0
347
0
518
171
133
Cove Point Road
0
698
37
1023
735
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 15 and 22, 2008
PM Peak Hour
7
Solomons Island Road
MD 2 / MD 4
1590
1583
7
1189
Nursery Road
MD 765P
1
8
7
17
1590
1188
10
1198
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 17 and 29, 2008
8
Solomons Island Road
MD 2 / MD 4
1570
3
1385
182
1164
Pardoe Road
MD 765Q
29
1
24
2
21
116
5
123
2
189
Pardoe Road
MD 765Q
21
1047
5
1408
1073
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 23 and 28, 2008
9
Solomons Island Road
MD 2 / MD 4
1332
0
922
410
1218
Cove Point Road
MD 497
0
0
0
0
204
0
353
149
564
Cove Point Road
0
1014
154
1071
1168
Solomons Island Road
MD 2 / MD 4
KLD Counts
April 15 and 22, 2008

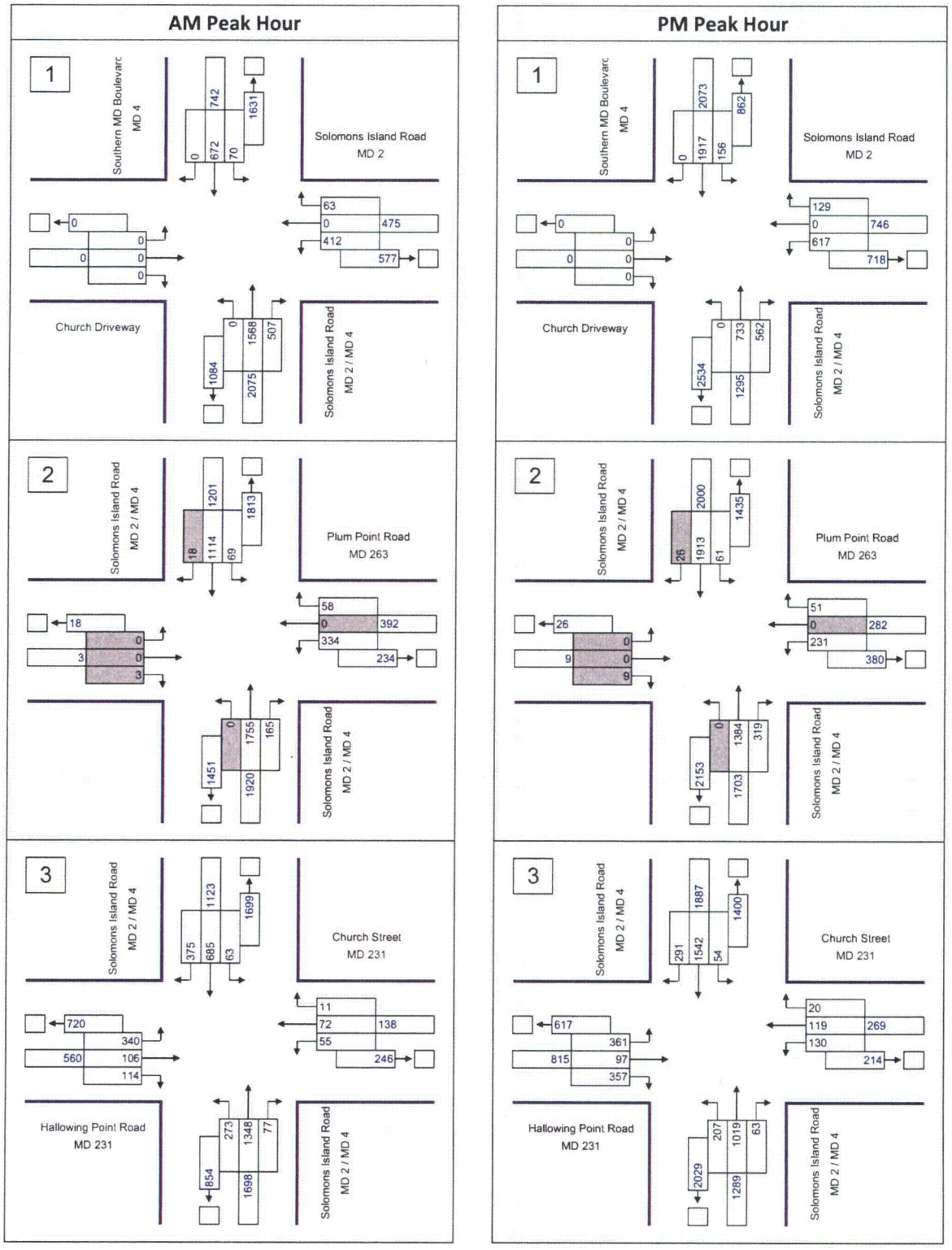

AM Peak Hour
1
Southern MD Boulevard
MD 4
Solomons Island Road
MD 2
Church Driveway
Solomons Island Road
MD 2 / MD 4
0
742
1631
672
70
63
0
475
412
577
0
0
0
0
0
0
1084
0
1568
507
2075
2
Solomons Island Road
MD 2 / MD 4
Plum Point Road
MD 263
1201
1813
18
1114
69
58
0
392
334
234
18
0
3
0
3
1451
0
1755
165
1920
3
Solomons Island Road
MD 2 / MD 4
Church Street
MD 231
Hallowing Point Road
MD 231
1123
1699
375
685
63
11
72
138
55
246
720
340
560
106
114
273
1348
77
854
1698
PM Peak Hour
1
Southern MD Boulevard
MD 4
Solomons Island Road
MD 2
Church Driveway
Solomons Island Road
MD 2 / MD 4
0
2073
862
1917
156
129
0
746
617
718
0
0
0
0
0
0
2534
0
733
562
1295
2
Solomons Island Road
MD 2 / MD 4
Plum Point Road
MD 263
2000
1435
26
1913
61
51
0
282
231
380
26
0
9
0
9
2153
0
1384
319
1703
3
Solomons Island Road
MD 2 / MD 4
Church Street
MD 231
Hallowing Point Road
MD 231
1887
1400
291
1542
54
20
119
269
130
214
617
361
815
97
357
207
1019
63
2029
1289


AM Peak Hour
4
Solomons Island Road
MD 2 / MD 4
Calvert Beach Road
MD 765J
Ball Road
MD 765S
Solomons Island Road
MD 2 / MD 4
10
1129
1172
33
1499
84
35
169
40
94
200
35
349
114
133
1337
39
1264
60
1363
5
Solomons Island Road
MD 2 / MD 4
Calvert Cliffs Parkway
MD 2N
Saw Mill Road
MD 765 N
Solomons Island Road
MD 2 / MD 4
1
970
1030
59
974
1
14
0
0
14
37
0
79
42
118
1026
0
937
59
996
6
Solomons Island Road
MD 2 / MD 4
Nursery Road
MD 2AF
White Sands Drive
MD 2P
Solomons Island Road
MD 2 / MD 4
20
779
799
0
1303
37
137
199
0
62
4
0
4
0
0
841
17
1162
0
1179
PM Peak Hour
4
Solomons Island Road
MD 2 / MD 4
Calvert Beach Road
MD 765J
Ball Road
MD 765S
Solomons Island Road
MD 2 / MD 4
42
1433
1546
71
1101
219
22
169
54
93
76
79
262
107
203
1633
98
1003
78
1179
5
Solomons Island Road
MD 2 / MD 4
Calvert Cliffs Parkway
MD 2N
Saw Mill Road
MD 765 N
Solomons Island Road
MD 2 / MD 4
2
1669
1676
5
1110
2
24
0
0
24
51
0
103
52
53
1745
0
1059
48
1107
6
Solomons Island Road
MD 2 / MD 4
Nursery Road
MD 2AF
White Sands Drive
MD 2P
Solomons Island Road
MD 2 / MD 4
86
1279
1365
0
1038
172
82
141
0
59
4
0
4
0
1
1338
86
952
1
1039

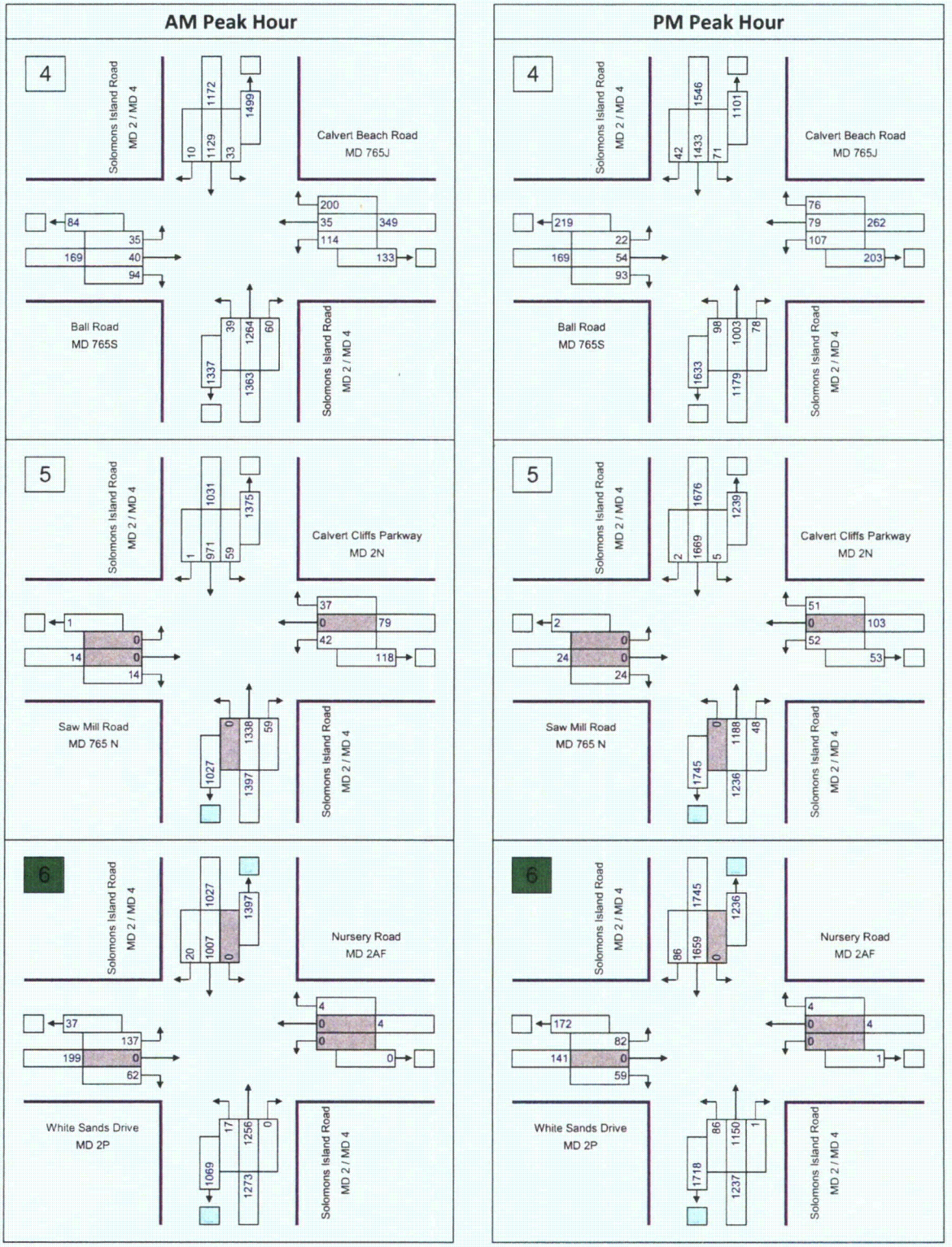


Grow thru volumes at 2% annual to 2010

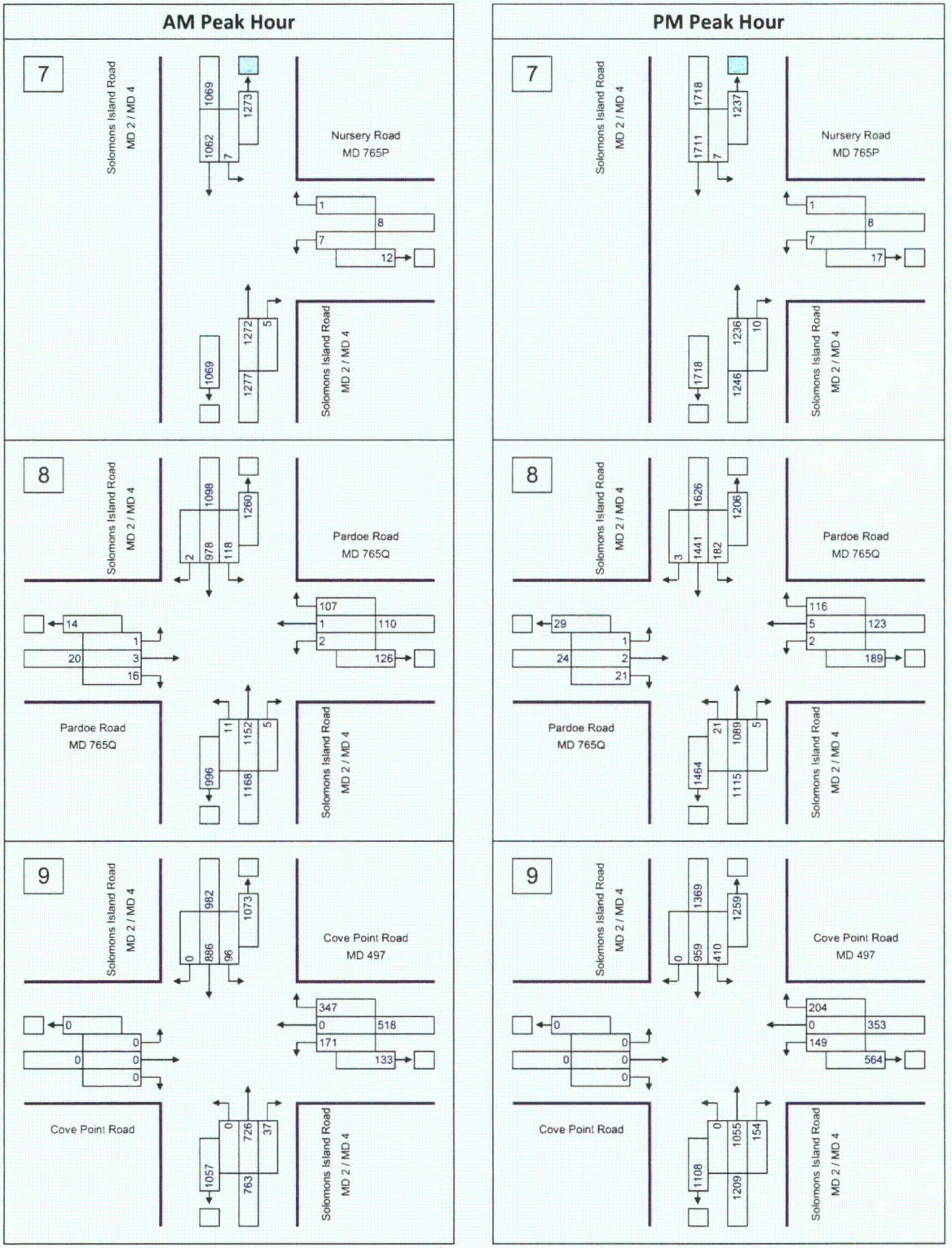
Existing (2010) Balanced



Existing (2010) Balanced



Existing (2010) Balanced

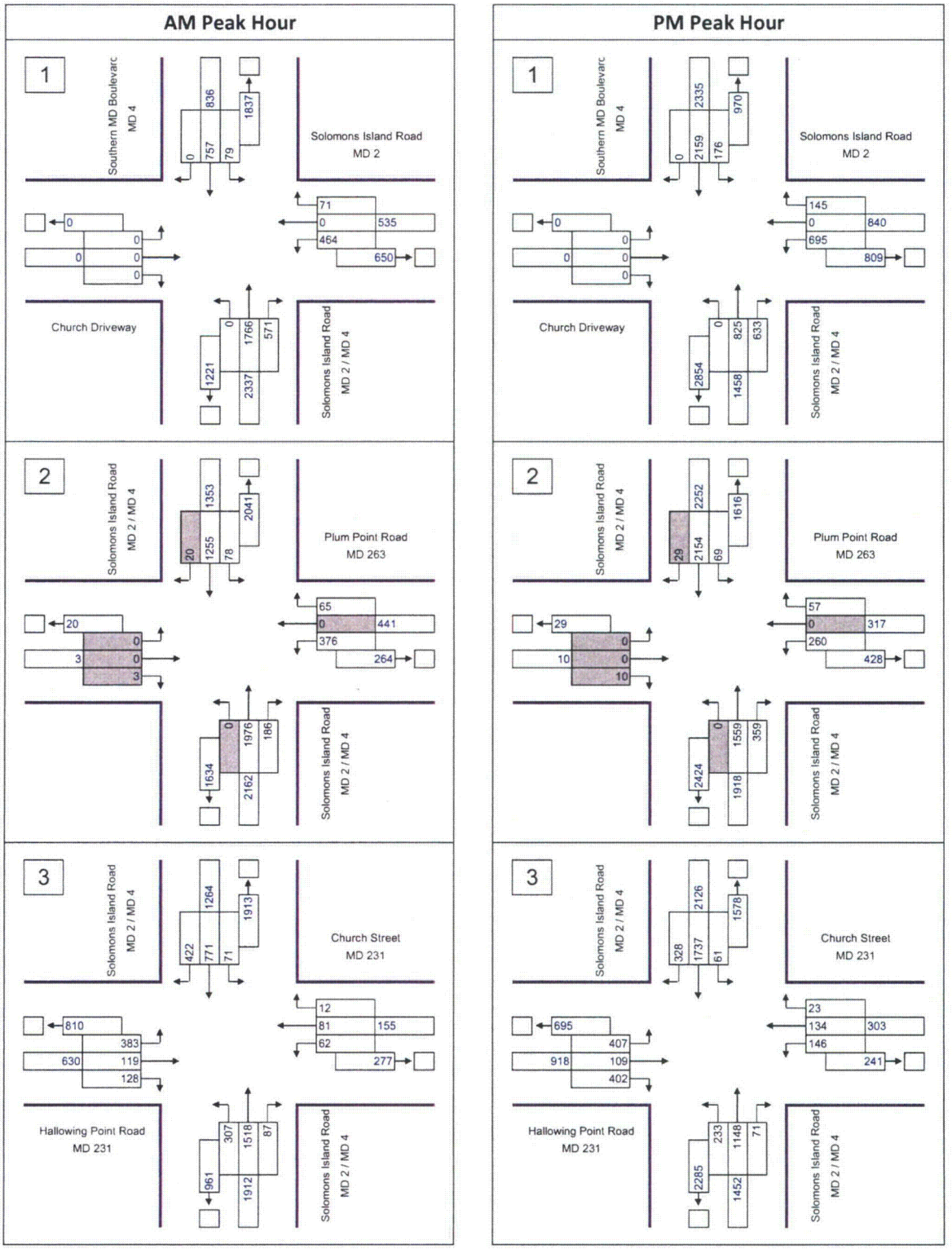


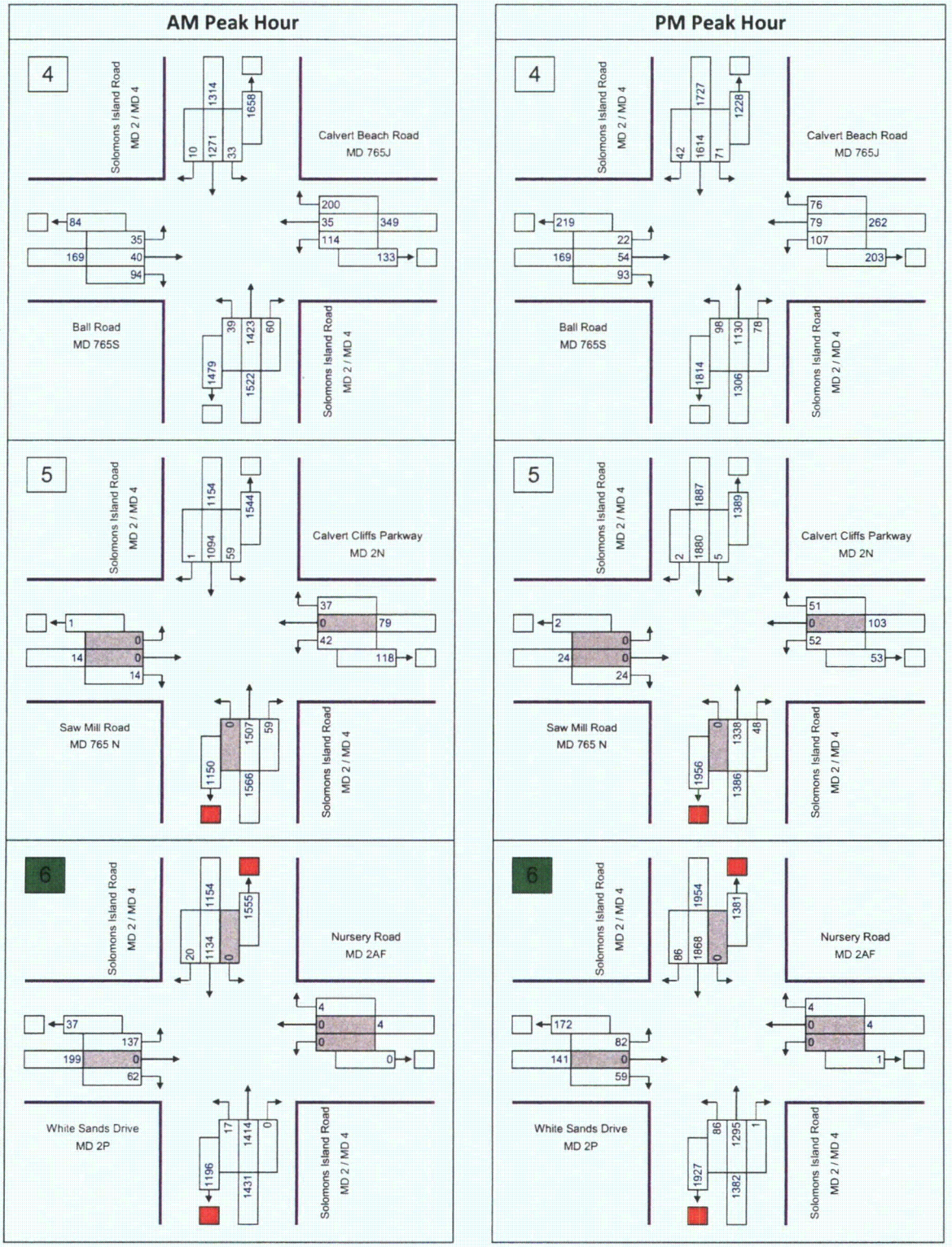
Balanced grown volumes

Adjusted thrus only

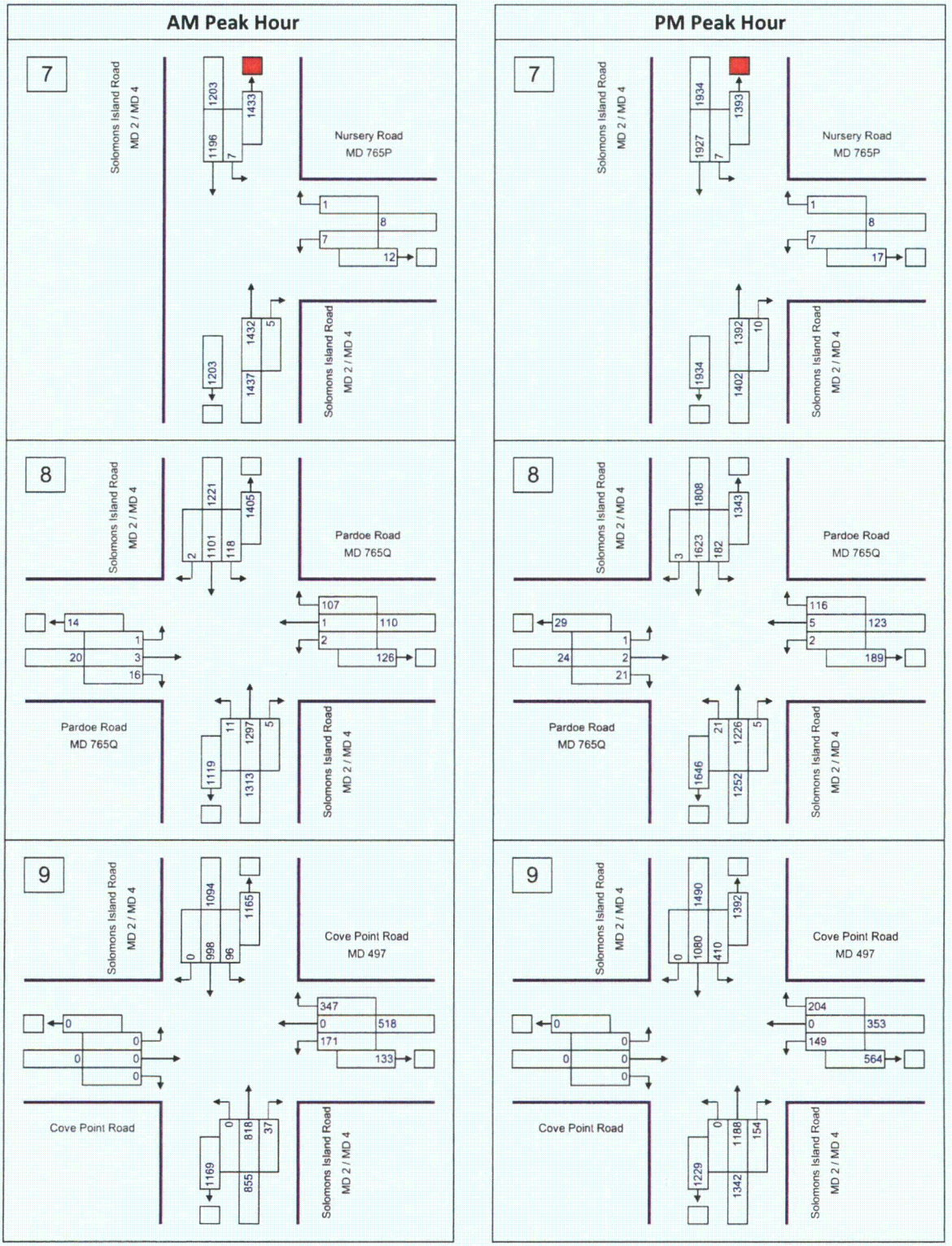
Higher values rule

Grown to 2016



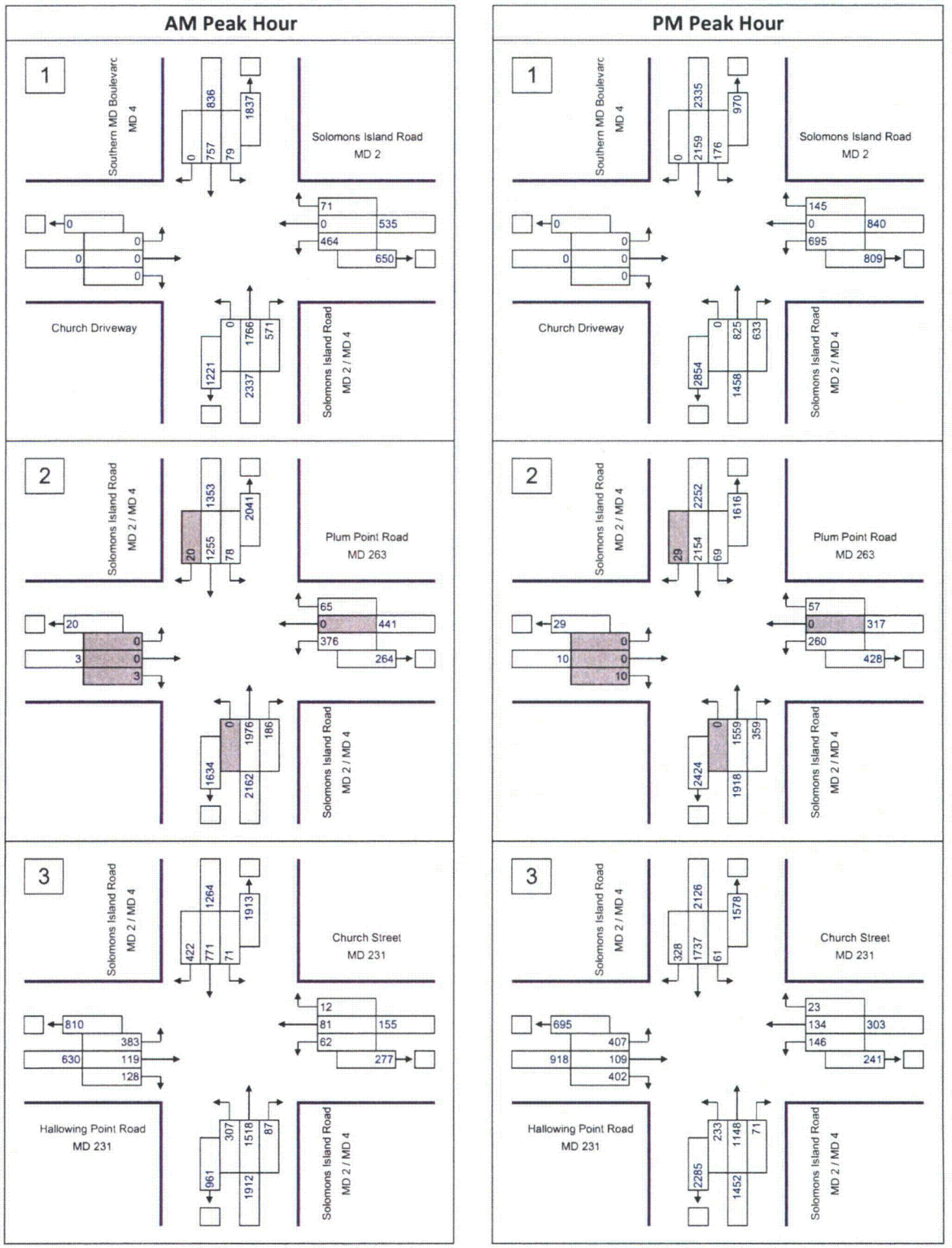

AM Peak Hour
PM Peak Hour
4
5
6
Solomons Island Road
MD 2 / MD 4
Calvert Beach Road
MD 765J
Ball Road
MD 765S
Calvert Cliffs Parkway
MD 2N
Saw Mill Road
MD 765 N
Nursery Road
MD 2AF
White Sands Drive
MD 2P
10 1271 33 1314 1658
84 35 169 40 94
200 35 349 114 133
39 1423 60 1479 1522
1 1094 59 1154 1544
1 0 14 0 14
37 0 79 42 118
0 1507 59 1150 1566
20 1134 0 1154 1555
37 137 199 0 62
4 0 4 0
17 1414 0 1196 1431
42 1614 71 1727 1228
219 22 169 54 93
76 79 262 107 203
98 1130 78 1814 1306
2 1880 5 1887 1389
2 0 24 0 24
51 0 103 52 53
0 1338 48 1956 1386
86 1868 0 1954 1381
172 82 141 0 59
4 0 4 0 1
86 1295 1 1927 1382

Grown to 2016

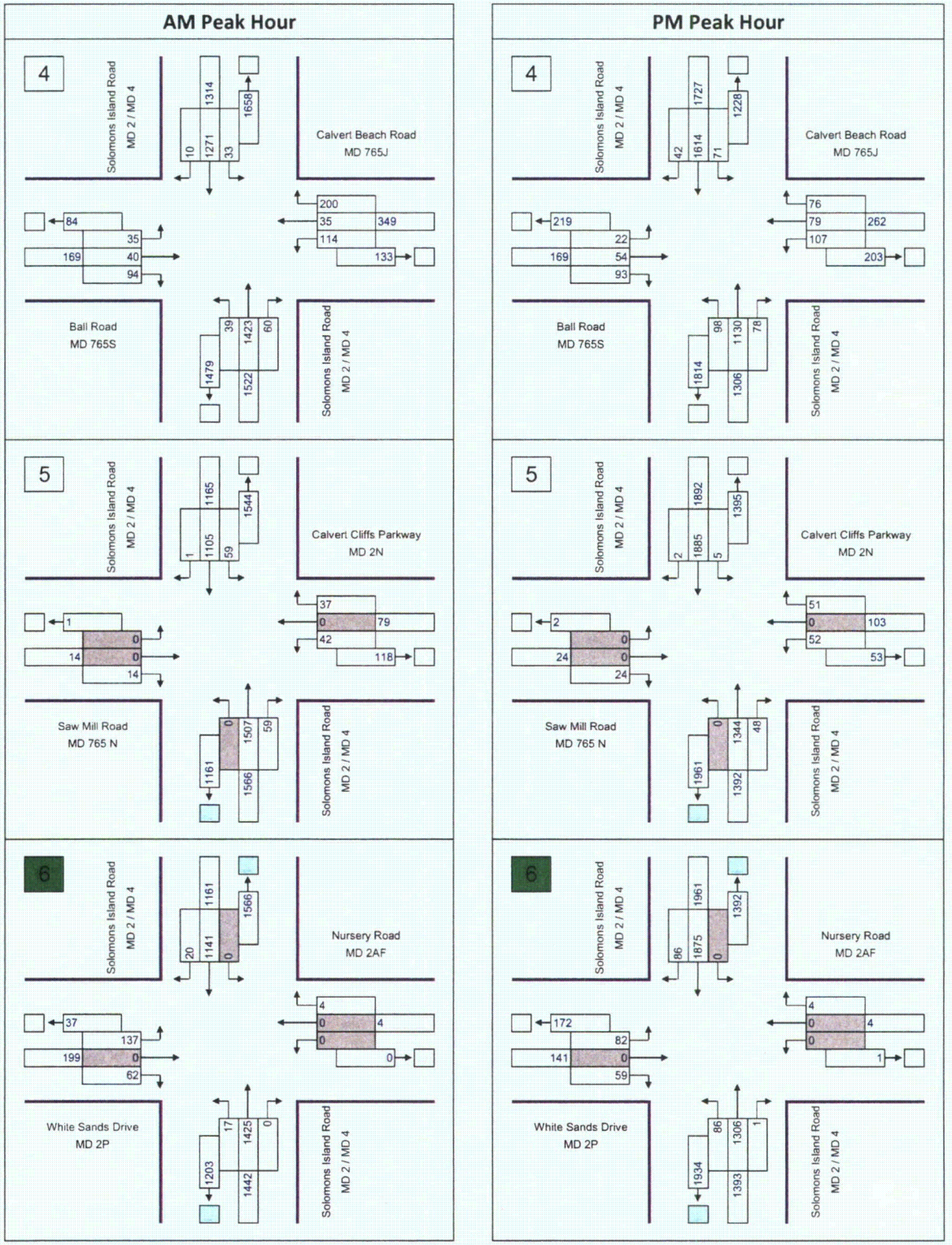


Grow thru volumes at 2% annual to 2015

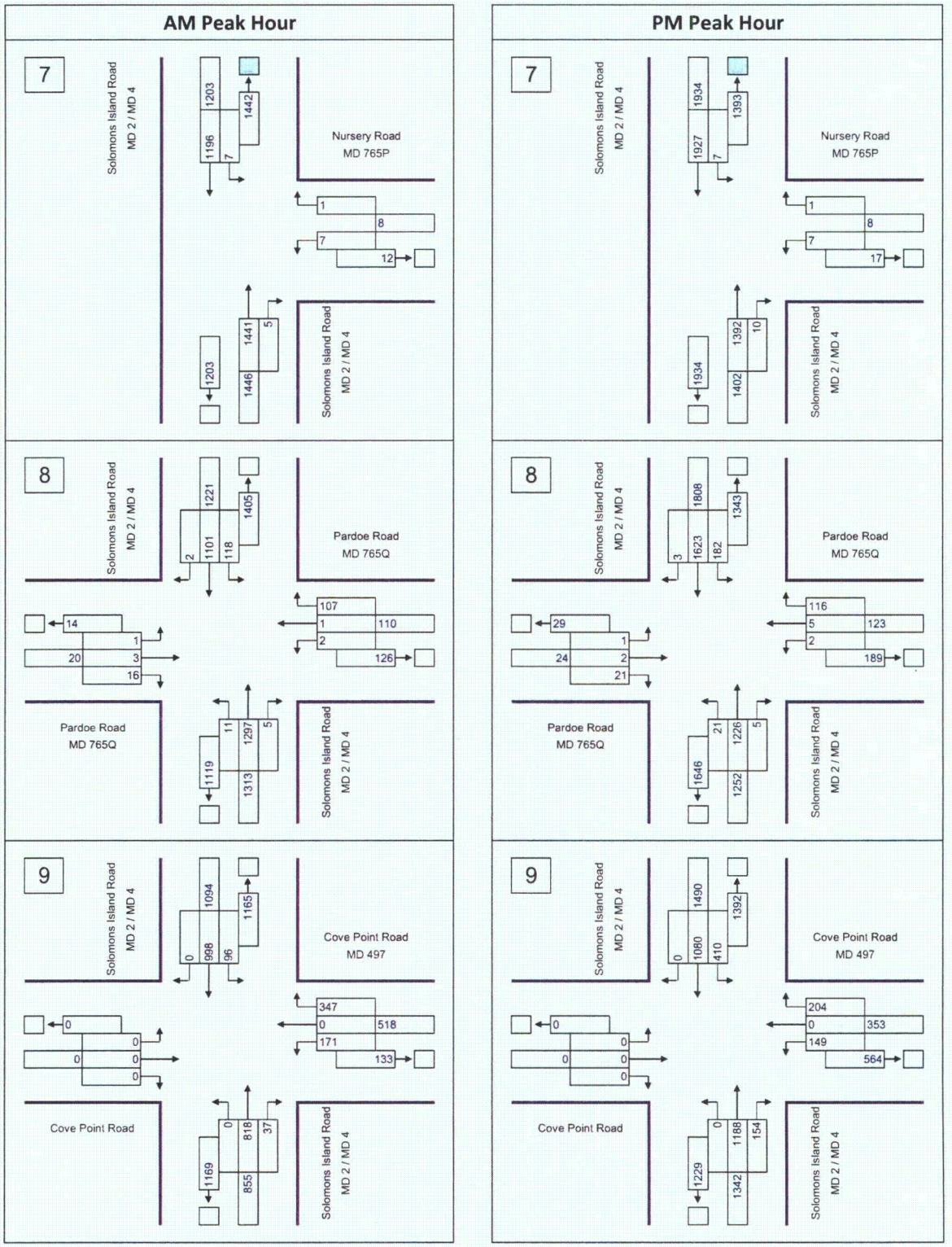
Background (2016) Balanced



Background (2016) Balanced



Background (2016) Balanced



Balanced grown volumes

Adjusted thrus only

Higher values rule

In reply, please refer to: 20834532

MEMORANDUM

TO: Ed Miller, PE
Principal Environmental Engineer
Constellation Energy
CPG – Environmental Services

FROM: Tim Ryan, PE, PTOE
Senior Traffic Engineer
URS Corporation

DATE: September 21, 2010

RE: Meeting Summary
UniStar CC3 Traffic Issues Meeting
September 7, 2010

A meeting for the topic referenced above was held in the offices of the Maryland State Highway Administration (SHA) on September 7, 2010, starting at 11:00 AM. The following individuals attended:

Frank Coxon	SHA Engineering and Access Permits Division (EAPD)
Steven Foster	SHA EAPD
Jim Holls	SHA EAPD (WBCM)
Mike Milbradt	UniStar
Ed Miller	UniStar
Dimitri Lutchenkov	UniStar
Wayne McFall	URS
Rebecca Myrick	URS
Tim Ryan	URS

On the phone, from SHA District 5, were the following individuals:

Kim Tran	SHA
Greg Phillips	SHA
Michelle Vrikkis	SHA

The following points were discussed:

1. SHA's letter, responding to the July 30, 2010 Technical Memorandum for the Calvert Cliffs Nuclear Power Plant, was the first topic of discussion. UniStar expressed concern over one of the comments (discussed further below). There were no concerns with the other SHA comments; they will be incorporated into future traffic analyses.

2. One of SHA's comments was that 10% trucks should be assumed to enter the site from southbound MD 2/4 during the AM peak hour. Given UniStar's ability to control access to the site by any vehicle, at any time, UniStar feels that the 2% value (used in the July 30, 2010 Technical Memorandum) is more realistic. SHA expressed concern about the impacts on intersection operations and queuing on southbound MD2/4, if more trucks than anticipated arrive at the site during the peak hour. SHA also expressed concern that queuing of vehicles at UniStar's gate could extend back into MD 2/4, particularly if some vehicles are denied entry.

   It was agreed that URS would perform additional Synchro/SimTraffic analyses, to determine the sensitivity of the assumed truck percentage to intersection operations, queuing on southbound MD 2/4 and queuing at the UniStar gate. The proposed gate layout and operation will be designed to minimize queues and avoid any impacts to MD 2/4. The proposed gate location will be over 4,000 feet from the White Sands/ MD 2/4 intersection. Potential mitigation strategies to accommodate unforeseen queuing will be developed. These strategies could include a truck "holding area" on the CC3 Access Road between MD 2/4 and the UniStar gate as well as "squared off" left turn lanes on southbound MD 2/4.

3. With regard to other parameters to be used in the Traffic Study:

   a. At the intersection of MD 2/4 and White Sands Drive, SHA is open to either two or three southbound left turn lanes, provided that the queuing/delay criteria agreed upon at the June 11, 2010 meeting are met.
   b. The intersection of MD 2/4 and MD 263 does not need to be addressed.
   c. If widening to provide an additional thru lane is needed at an intersection, that additional thru lane should be carried downstream of the intersection in accordance with Figure 2C-6a of the Maryland Manual on Uniform Traffic Control Devices. The length of the additional through lane on the upstream side of the intersection should be long enough to handle the 95th percentile queue. Beyond this, additional mainline widening of MD 2/4 does not need to be considered.
   d. SHA is still considering the trip distribution to be used north of the project site. SHA's final recommendations about this topic will be provided in about a week.

e. Critical lane analyis should be used for all intersections, with the exception of the intersection of MD 2/4 and White Sands Drive, where Synchro/SimTraffic can be used.
f. The Traffic Study should identify improvements necessary to provide level of service (LOS) D at all study area intersections for "2015 Build" conditions. If it appears that the extent of those improvements is unrealistic, the Traffic Study should also identify improvements that provide as close to LOS D as possible. For those intersections which are forecast to operate at LOS E or F under "2015 No Build" conditions, the Traffic Study should also identify improvements which would mitigate "Build" traffic such that the "2015 No Build" critical lane volume is maintained.

4. For "half signals" (such as the signal currently in operation at the MD 2 junction with MD 4), if a second left turn lane is proposed from the minor approach, the currently unsignalized thru movement should be signalized.

5. URS will provide plots of the vehicle turning templates for the proposed White Sands Road/ MD 2/4 intersection to the SHA.

6. In terms of formal agreements, SHA would strongly prefer a Letter of Intent between SHA and UniStar, rather than a Memorandum of Agreement (MOA).

URS believes that this is an accurate summary of our meeting. However, we understand that others in attendance may have different recollections. We would appreciate receiving any comments you might have within 10 calendar days of your receipt of this document. If we receive no comments within that period, we will move ahead based on the premise that this summary is completely accurate.

MEMORANDUM

TO: Ed Miller, PE
Principal Environmental Engineer
Constellation Energy
CPG – Environmental Services

FROM: Wayne McFall, PE
Project Manager
URS Corporation

DATE: December 10, 2010

RE: Draft Meeting Summary
UniStar CC3 Traffic Issues Meeting
December 8, 2010

A meeting for the topic referenced above was held in the offices of the Maryland State Highway Administration (SHA) on December 8, 2010, starting at 10:00 AM. The following individuals attended:

Frank Coxon	SHA Engineering and Access Permits Division (EAPD)
Steven Foster	SHA EAPD
Jim Holls	SHA EAPD (WBCM)
Mike Milbradt	UniStar
Ed Miller	UniStar
Dimitri Lutchenkov	UniStar
Tim Ryan	URS
Wayne McFall	URS

The following points were discussed:

1. UniStar explained that the project is still moving forward, despite the changes in corporate management of the project. The owner-applicant identified in previous submissions to various agencies has not changed.

2. SHA has reservations about the triple left turn lane proposed at White Sands Drive, because it is, in effect, a U-turn movement. SHA's research indicates that the efficiency of the movement could be decreased by as much as 55 percent, with resulting negative impacts on operations on MD 2/4. In addition, SHA is concerned about the possibility of sideswipe collisions due to the geometric constraints. As a result, the SHA developed a concept for a temporary at-grade intersection relocated to a point where the left turn does not result in a U-turn. The SHA provided a concept plan for this option to UniStar on December 3, 2010.

3. The SHA requested that UniStar consider a flyover ramp/bridge to provide the southbound left turn movement as an alternative to the temporary at-grade intersection. URS presented very preliminary results of analyses of a flyover, which revealed a number of complications such as potential right-of-way impacts, impacts to buildings on the east side of MD 2/4, utility impacts and the close proximity of the ramp terminus to the Saw Mill Road intersection. In addition, the construction and long term maintenance costs of providing a flyover are expected to be significantly higher than those related to providing a temporary at-grade intersection. The SHA requested a concept study of the flyover option, including an evaluation of the impacts and costs of this option versus the at-grade intersection option.

4. With specific regard to the relocated temporary at-grade intersection, the following points were discussed:

   a. A break on the controlled-access line is acceptable for this location, provided the intersection will be closed after construction of CC3 is completed. An SHA administrative approval is all that is required for this temporary break.
   b. SHA District 5, the Office of Traffic and Safety, and the SHA Administrator have agreed that this concept is feasible.
   c. The existing left turn movement from Calvert Cliffs Parkway onto southbound MD 2/4 would need to be accommodated during the life of the temporary access intersections in one of the following ways:
      i. Full signalization of the MD 2/4 at Calvert Cliffs Parkway intersection
      ii. Requiring southbound left turners from Calvert Cliffs Parkway to actually turn right, and make a U-turn in the median of MD 2/4
      iii. Internal connections on the Calvert Cliffs site, to allow those vehicles to use the temporary at-grade intersection to turn left onto southbound MD 2/4.
   d. Any one of these three approaches would be acceptable. Unistar will investigate the corporate feasibility of the third approach.

5. Submission of both a Traffic Impact Study (TIS) and "Design Concepts" is now required. The Design Concepts should reflect the changes in intersection configurations proposed in the TIS. The Design Concepts for construction conditions should include a flyover, including an evaluation of the impacts and costs of this option versus the at-grade intersection option. The fly-over concept can be evaluated in two dimensions for the purposes of this study.

6. It was agreed that the TIS will be reviewed and approved in two parts. The first would deal only with construction conditions, and will be submitted first. The second, which will deal only with post-construction conditions, will be submitted at a later date.

7. Under "post-construction" conditions, it will be necessary for the relocated temporary at-grade intersection to be closed. As a result, access/egress for the CC3 site after construction is complete will need to be provided at White Sands Drive (with a full traffic signal), or at Nursery Road (perhaps with a partial signal), or at Calvert Cliffs Parkway (if shared access from MD 2/4 is a corporate possibility between the owners of CC1/CC2 and CC3).

8. The Letter of Intent (LOI) was then discussed. The SHA requested that UniStar prepare a draft LOI that will be the basis of the final Memorandum of Agreement (MOA) The SHA will prepare the final Memorandum of Agreement. Some of the issues that will be addressed in the MOA include:
   - Liability – use standard language in sample MOA's
   - Roles and Responsibilities of SHA and UniStar
   - Schedule – when do MD 2/4 improvements have to be complete?
   - Design submittal requirements - # of review submittals?
   - SHA review response times
   - Permits
   - Construction cost responsibility (including utility relocations)
   - SHA inspection cost reimbursement (requires a surety for 15% of construction cost)
   - Right-of-way acquisition

9. Since the proposed MD 2/4 Split intersection improvements will require right-of-way acquisition, UniStar requested that the MD 2/4 Split intersection improvements be an SHA project in which UniStar would contribute their share of the construction cost.

URS believes that this is an accurate summary of our meeting. However, we understand that others in attendance may have different recollections. We would appreciate receiving any comments you might have within 10 calendar days of your receipt of this document. If we receive no comments within that period, we will move ahead based on the premise that this summary is completely accurate.

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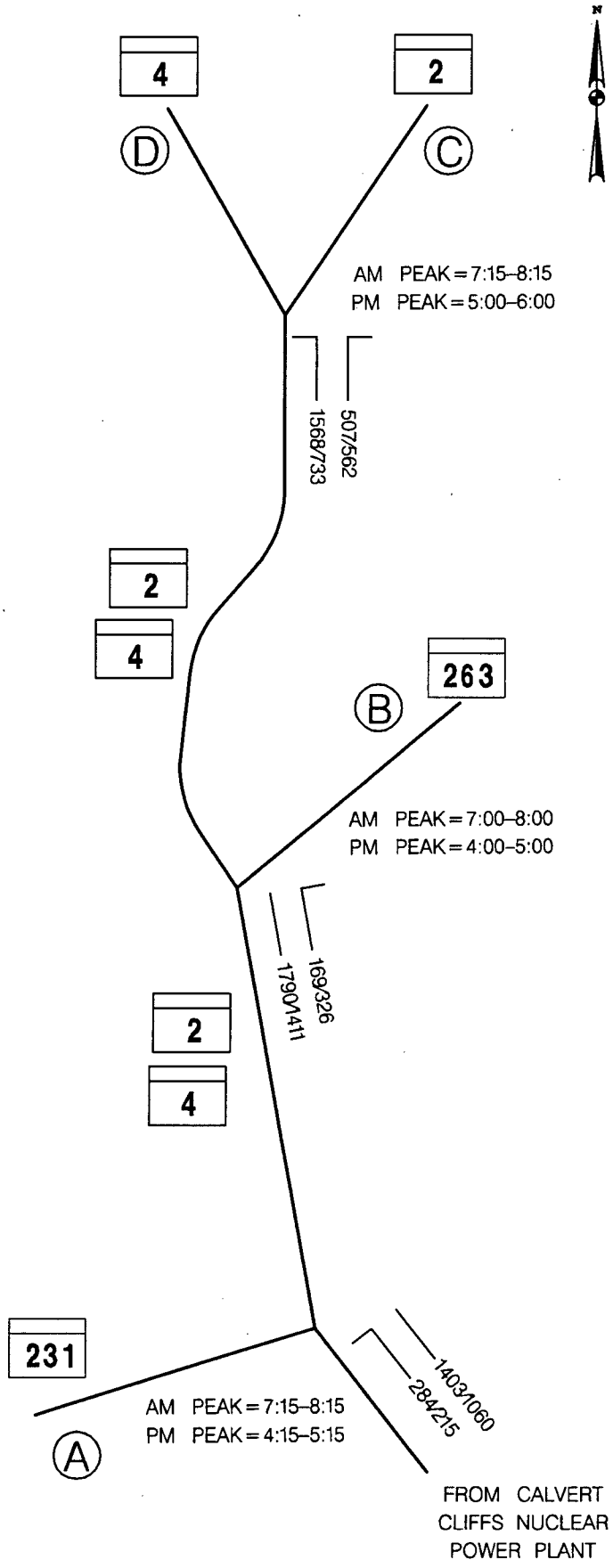

CALVERT CLIFFS NUCLEAR POWER PLANT
NB DISTRIBUTION AT
MD 231, MD 263, MD 2 AND MD 4

Satya Muthuswamy

From: Wayne_McFall@URSCorp.com
Sent: Tuesday, October 26, 2010 3:31 PM
To: Satya Muthuswamy
Cc: 'Bill__McShane' <bmcshane@kldcompanies.com/O=, Rebecca_Myrick@URSCorp.com, 'PEPTOETimothyA.Ryan' <timothy_ryan
Subject: Fw: Calvert Cliffs CC3 - gate queue analysis

fyi

Thanks,
Wayne

<<<<<<<<<<<<<>>>>>>>>>>>>>
M. Wayne McFall, P.E.
URS
4 North Park Drive, Suite 300
Hunt Valley, MD 21030
Office Phone: (410) 891-9205
Cell Phone: (443) 326-1192
Fax: (410) 785-6818
email: wayne_mcfall@urscorp.com
<<<<<<<<<<<<<>>>>>>>>>>>>>
scc

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----- Forwarded by Wayne McFall/HuntValley/URSCorp on 10/26/2010 03:28 PM -----

Wayne McFall/HuntValley/URSCorp

10/07/2010 03:02 PM

To Frank Coxon <FCoxon@sha.state.md.us>
cc JHOLLS@WBCM.com, 'Greg Phillips' <GPhillips@sha.state.md.us>, Kimberly Tran <ktran@sha.state.md.us>, "'Timothy_Ryan@URSCorp.com'" <Timothy_Ryan@URSCorp.com>, Rebecca Myrick/HuntValley/URSCorp@URSCorp, "Miller, Edward A" <Edward.Miller@constellation.com>, Stephanie Huck/HuntValley/URSCorp@URSCORP, sfoster1@sha.state.md.us
Subject Calvert Cliffs CC3 - gate queue analysis

Frank,
As discussed in our meeting with the SHA on 9-7-10, URS has performed a Gate Queue Analysis, using SimTraffic, for the proposed gate for the Calvert Cliffs construction site. The SimTraffic files are too big to email. See instructions below for downloading these files.

UniStar plans to construct a gate that provides 3 lanes for entering traffic at the CC3 Gate, with a provision for widening to provide additional capacity, if required. Only workers with a permit on their vehicle will be allowed to enter the site during the AM peak period. Delivery and construction trucks and visitors will not be allowed to pass through the gate during the AM peak period. A pull-off parking area will be provided upstream of the gate, to provide waiting trucks and visitors with a separate holding area. After the AM peak period, trucks and visitors will utilize the gates.

The gate will be located approximately 3,100 feet from the proposed White Sands/ MD 2/4 intersection. One of the key

parameters is the processing time for each vehicle. Unistar's proposed gate operation for workers with permits on their vehicles will involve a quick check of the permit on the vehicle as they pass through the gate without stopping. This is expected to be less than a 7 second delay per vehicle. Even though there will be no trucks allowed through the gate during the AM peak period, the analyses includes 2% trucks, which provides a higher factor of safety for determining the queue length. Using these parameters, the analysis shows that the queue will not backup to MD 2/4.

Please use the following FTP site information for downloading the SimTraffic files.

address: https://moveitdmz102.urscorp.com/
username: ursftp@gmail.com
password: huntvalley01

Thanks,
Wayne

<<<<<<<<<<<<<>>>>>>>>>>>>>
M. Wayne McFall, P.E.
URS
4 North Park Drive, Suite 300
Hunt Valley, MD 21030
Office Phone: (410) 891-9205
Cell Phone: (443) 326-1192
Fax: (410) 785-6818
email: wayne_mcfall@urscorp.com
<<<<<<<<<<<<<>>>>>>>>>>>>>
scc

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Brian Damiani

From: Satya Muthuswamy [satya@kldcompanies.com]
Sent: Friday, December 17, 2010 1:50 PM
To: Brian Damiani
Subject: Fw: Direction from UniStar to KLD

Flag Status: Flagged

Fyi

Satya Muthuswamy, PE (OH), PTOE
Senior Traffic Engineer
KLD
(631) 617-5650 x 216

From: Rebecca_Myrick@URSCorp.com
Date: Fri, 17 Dec 2010 13:05:39 -0500
To: <satya@kldcompanies.com>
Cc: 'Bill McShane'<bmcshane@kldcompanies.com>; 'Miller, Edward A'<Edward.Miller@constellation.com>; <Timothy_Ryan@URSCorp.com>; <Wayne_McFall@URSCorp.com>
Subject: RE: Direction from UniStar to KLD

We did the gate queue analysis for the relocated entrance. The gate needs 4 lanes, if we assume 7 second service times.

Thanks.

Rebecca L. Myrick, PE, PTOE (formerly Rebecca L. Thomas)

URS Corporation
4 North Park Drive, Suite 300 * Hunt Valley, Maryland 21030
Office Tel: 410-785-7220 * Fax: 410-785-6818
Direct Tel: 410-891-9527 * Cell: 443-275-8083

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Satya Muthuswamy <satya@kldcompanies.com>

12/17/2010 12:58 PM

Please respond to satya@kldcompanies.com

To Wayne_McFall@URSCorp.com
cc 'Bill McShane' <bmcshane@kldcompanies.com>, "'Miller, Edward A'" <Edward.Miller@constellation.com>, Timothy_Ryan@URSCorp.com, Rebecca_Myrick@URSCorp.com
Subject RE: Direction from UniStar to KLD

Intersection: 6: CC3 Access Road & Gate

Movement	EB	EB	EB	EB
Directions Served	T	T	T	T
Maximum Queue (ft)	702	683	482	415
Average Queue (ft)	363	333	291	298
95th Queue (ft)	547	506	394	390
Link Distance (ft)	1188	1188	1188	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				500
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	


MARYLAND
2/4
CALVERT CLIFFS PKWY
NEW CC3 ACCESS ROAD
NURSERY ROAD
SAW MILL ROAD
CONCEPT PLAN
NOT FOR CONSTRUCTION
UniStar
LEGEND
Calvert Cliffs Parkway
New Access Road
Banner NAR-1
December 2010

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	2	2	2	1	3	2
Volume (vph)	42	0	1566	365	1458	1119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		7.0	7.0	6.0	7.0
Lane Util. Factor	0.97		0.95	1.00	0.94	0.95
Frt	1.00		1.00	0.85	1.00	1.00
Flt Protected	0.95		1.00	1.00	0.95	1.00
Satd. Flow (prot)	3183		3539	1468	4627	3539
Flt Permitted	0.95		1.00	1.00	0.95	1.00
Satd. Flow (perm)	3183		3539	1468	4627	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	0	1702	397	1585	1216
RTOR Reduction (vph)	0	0	0	39	0	0
Lane Group Flow (vph)	46	0	1702	358	1585	1216
Heavy Vehicles (%)	10%	10%	2%	10%	10%	2%
Turn Type		pm+ov		Perm	Prot	
Protected Phases	8	1	2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)	4.0		94.3	94.3	63.7	164.0
Effective Green, g (s)	4.0		94.3	94.3	63.7	164.0
Actuated g/C Ratio	0.02		0.52	0.52	0.35	0.91
Clearance Time (s)	5.0		7.0	7.0	6.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	71		1854	769	1637	3224
v/s Ratio Prot	c0.01		c0.48		c0.34	0.34
v/s Ratio Perm				0.24		
v/c Ratio	0.65		0.92	0.47	0.97	0.38
Uniform Delay, d1	87.3		39.3	27.0	57.2	1.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	18.5		8.8	2.0	13.2	0.1
Delay (s)	105.8		48.1	29.0	70.4	1.1
Level of Service	F		D	C	E	A
Approach Delay (s)	105.8		44.5			40.3
Approach LOS	F		D			D

Intersection Summary			
HCM Average Control Delay	42.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	2	2	2	1	3	2
Volume (vph)	417	1458	1392	213	851	1909
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	7.0	7.0	6.0	7.0
Lane Util. Factor	0.97	0.88	0.95	1.00	0.94	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3183	2584	3539	1468	4627	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3183	2584	3539	1468	4627	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	453	1585	1513	232	925	2075
RTOR Reduction (vph)	0	0	0	122	0	0
Lane Group Flow (vph)	453	1585	1513	110	925	2075
Heavy Vehicles (%)	10%	10%	2%	10%	10%	2%
Turn Type		pt+ov		Perm	Prot	
Protected Phases	8	8 1	2		1	6
Permitted Phases				2		
Actuated Green, G (s)	24.0	83.0	85.0	85.0	53.0	144.0
Effective Green, g (s)	24.0	77.0	85.0	85.0	53.0	144.0
Actuated g/C Ratio	0.13	0.43	0.47	0.47	0.29	0.80
Clearance Time (s)	5.0		7.0	7.0	6.0	7.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	424	1105	1671	693	1362	2831
v/s Ratio Prot	0.14	c0.61	c0.43		0.20	0.59
v/s Ratio Perm				0.07		
v/c Ratio	1.07	1.43	0.91	0.16	0.68	0.73
Uniform Delay, d1	78.0	51.5	43.8	27.1	56.0	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	63.1	200.7	8.6	0.5	1.1	0.8
Delay (s)	141.1	252.2	52.4	27.6	57.0	9.5
Level of Service	F	F	D	C	E	A
Approach Delay (s)	227.5		49.1			24.2
Approach LOS	F		D			C

Intersection Summary			
HCM Average Control Delay	91.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	180.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

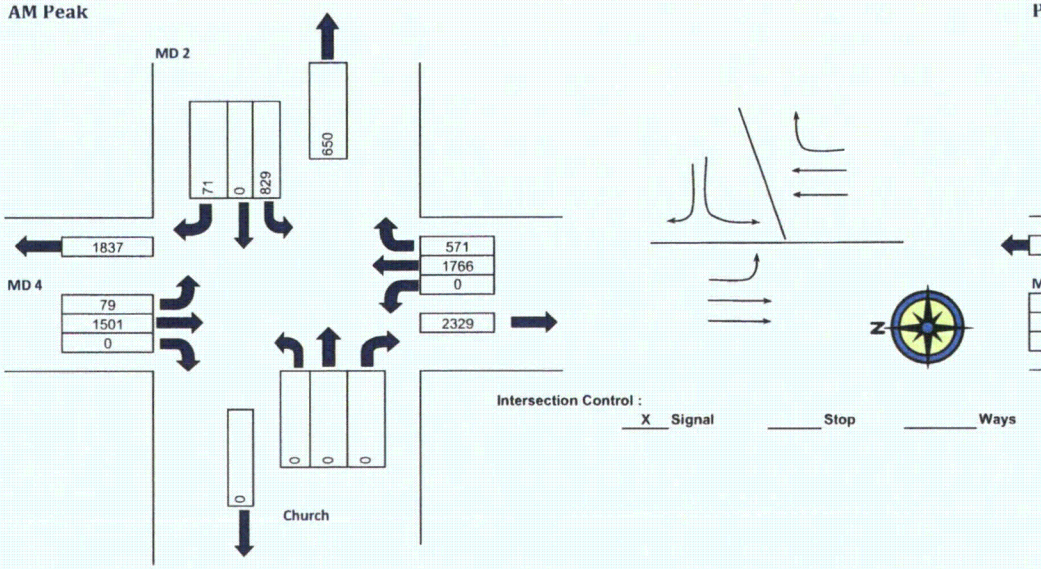
Intersection: 5: CC3 Access Road & MD 2 / MD 4

Movement	WB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	T	T	R	L	L	L	T	T
Maximum Queue (ft)	75	69	885	990	625	652	630	741	619	607
Average Queue (ft)	21	26	476	484	229	490	496	536	37	44
95th Queue (ft)	57	64	742	757	484	657	617	675	218	219
Link Distance (ft)	1188	1188	1085	1085				1067	1067	1067
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					600	1000	1000			
Storage Blk Time (%)				3	0					
Queuing Penalty (veh)				10	0					

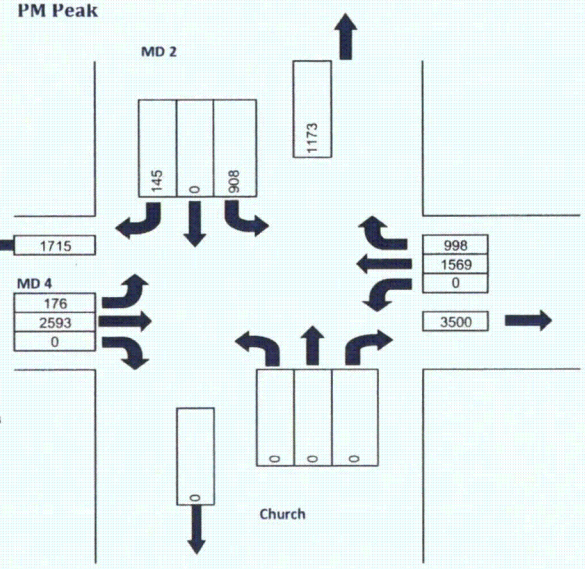
Intersection: 5: CC3 Access Road & MD 2 / MD 4

Movement	WB	WB	WB	WB	NB	NB	NB	SB	SB	SB	SB	SB
Directions Served	L	L	R	R	T	T	R	L	L	L	T	T
Maximum Queue (ft)	1250	1238	325	312	682	663	625	311	345	415	463	455
Average Queue (ft)	1223	1210	322	308	447	452	80	205	230	262	219	234
95th Queue (ft)	1256	1234	329	325	617	614	256	307	340	374	338	360
Link Distance (ft)	1188	1188			1085	1085				1067	1067	1067
Upstream Blk Time (%)	37	45										
Queuing Penalty (veh)	349	424										
Storage Bay Dist (ft)			300	300			600	1000	1000			
Storage Blk Time (%)		20	38	30		1						
Queuing Penalty (veh)		285	79	62		1						

AM Peak



PM Peak



Intersection Control :
X Signal ____ Stop ____ Ways

MD 2/MD 4 Diverge

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS
0	A
1000	B
1150	C
1300	D
1450	E
1600	F

Opposing Volume	PCE
0	1.1
200	2
600	3
800	4
1000	5

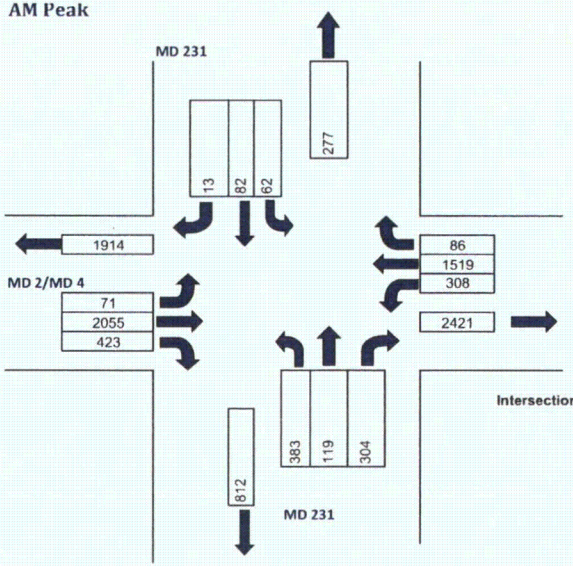
	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,766	0.55	971	79	1	79	1,050
	SBT	1,501	0.55	825				
	WBL	829	1	829	0	1	0	829

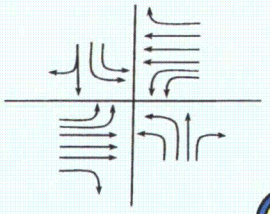
Remarks:	Critical Lane Volume	Total	1,879
NBR has RTOR, is concurrent with WBL		LOS	F
SBT not included in CLV calculation due to signal phasing		V/C	1.17

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,569	0.55	863	176	1	176	1,039
	SBT	2,593	0.55	1426				
	WBL	908	1	908	0	1	0	908

Remarks:	Critical Lane Volume	Total	1,946
NBR has RTOR, is concurrent with WBL		LOS	F
SBT not included in CLV calculation due to signal phasing		V/C	1.22

AM Peak

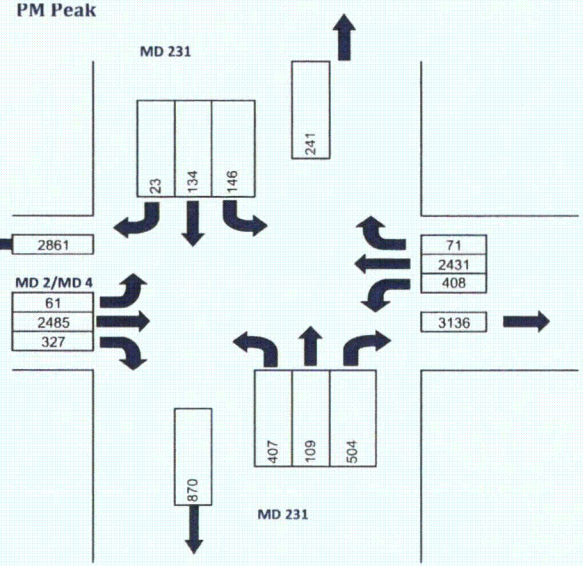




Intersection Control :

X Signal ____ Stop ____ Ways

PM Peak



MD 231 & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS	Opposing Volume	PCE
0	A		
1000	B	0	1.1
1150	C	200	2
1300	D	600	3
1450	E	800	4
1600	F	1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,519	0.40	607	71	0.6	43	650
	SBT	2,055	0.40	822	308	0.6	185	1,007
	EBL	383	0.60	230	0	1	0	230
	WBTR	94	1	94	0	1	0	94

Remarks: Split Phase, EB & WB
Right turns with a dedicated lane >150 ft are excluded

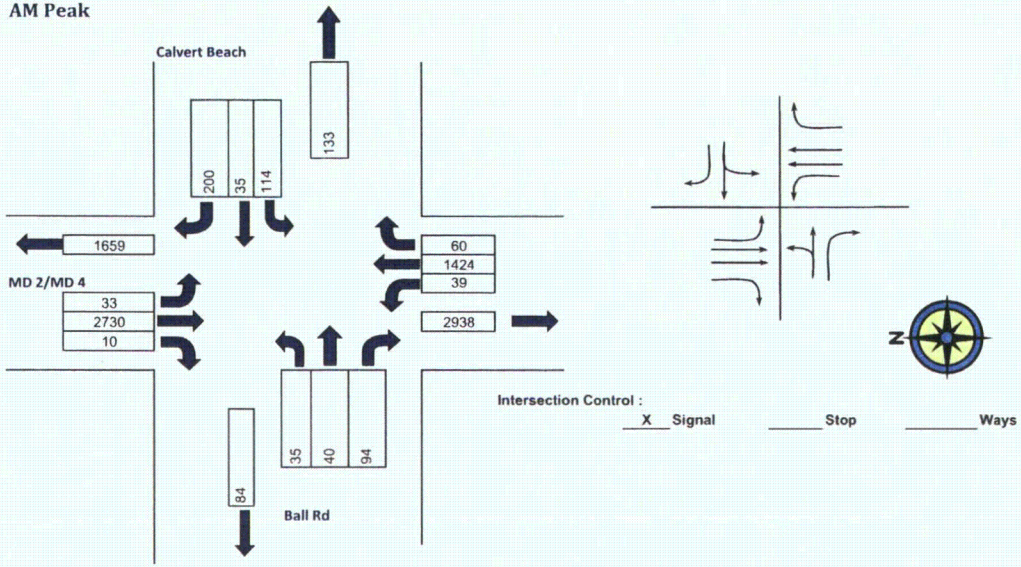
Critical Lane Volume — Total 1,331; LOS D; V/C 0.83

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	2,431	0.4	972	61	0.6	37	1,009
	SBT	2,485	0.4	994	408	0.6	245	1,239
	EBL	407	0.6	244	0	1	0	244
	WBTR	157	1	157	0	1	0	157

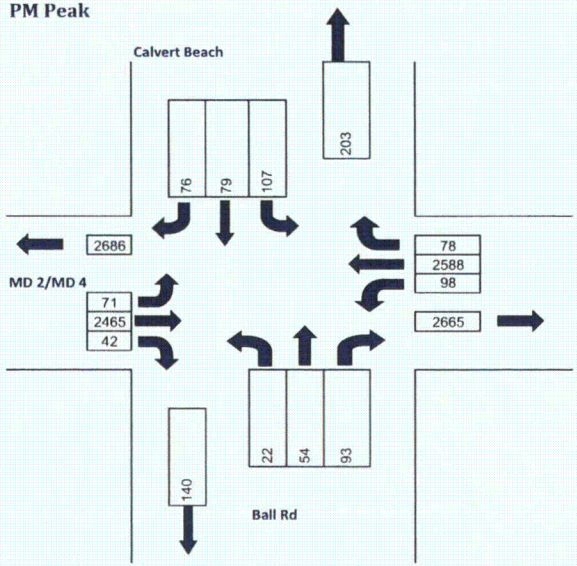
Remarks: Split Phase, EB & WB
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 1,640; LOS F; V/C 1.03

AM Peak



PM Peak



Intersection Control :

X Signal _____ Stop _____ Ways

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS
0	A
1000	B
1150	C
1300	D
1450	E
1600	F

Opposing Volume	PCE
0	1.1
200	2
600	3
800	4
1000	5

Calvert Beach/Ball Road &
MD 2/MD 4
Construction, 2016, No Mitigation

KLD Engineering, P.C.

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,424	0.55	783	33	1	33	816
	SBT	2,730	0.55	1,501	39	1	39	1,540
	EBTL	75	1.00	75	0	1	0	75
	WBTL	149	1	149	0	1	0	149

Remarks: Split Phase, EB & WB
Right turns with a dedicated lane >150 ft are excluded

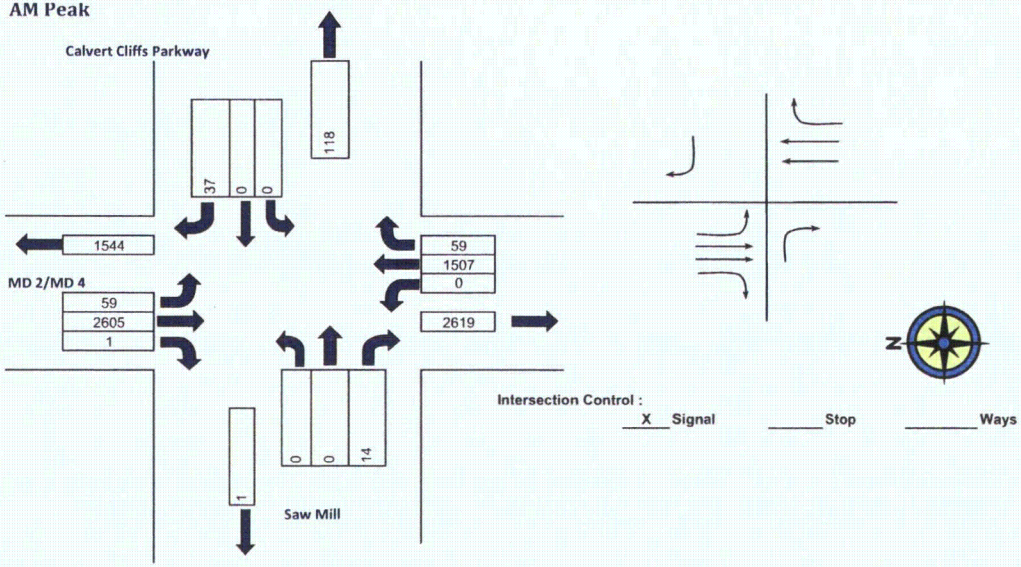
Critical Lane Volume — Total 1,764 | LOS F | V/C 1.10

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	2,588	0.55	1424	71	1	71	1,495
	SBT	2,465	0.55	1356	98	1	98	1,454
	EBTL	76	1	76	0	1	0	76
	WBTL	186	1	186	0	1	0	186

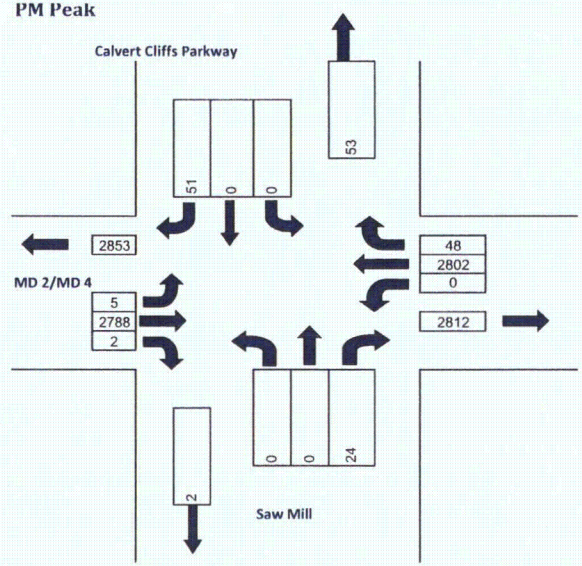
Remarks: Split Phase, EB & WB
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 1,757 | LOS F | V/C 1.10

AM Peak



PM Peak



Calvert Cliffs Parkway & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS
0	A
1000	B
1150	C
1300	D
1450	E
1600	F

Opposing Volume	PCE
0	1.1
200	2
600	3
800	4
1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,507	0.55	829	59	1	59	888
	WBL	0	1	0	0	1	0	0

Remarks:
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume

Total	888
LOS	A
V/C	0.55

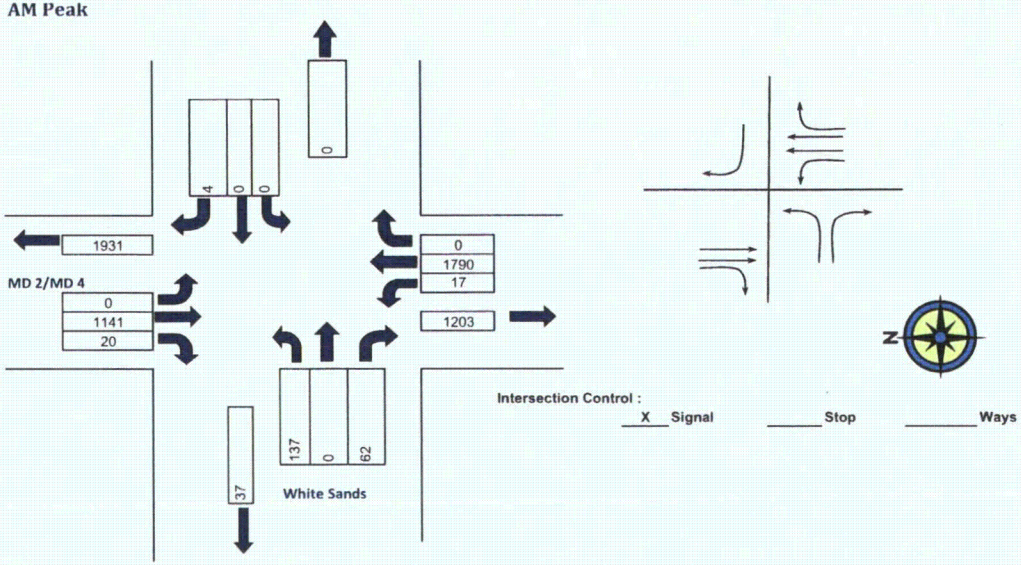
	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	2,802	0.55	1541	5	1	5	1,546
	WBL	0	1	0	0	1	0	0

Remarks:
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume

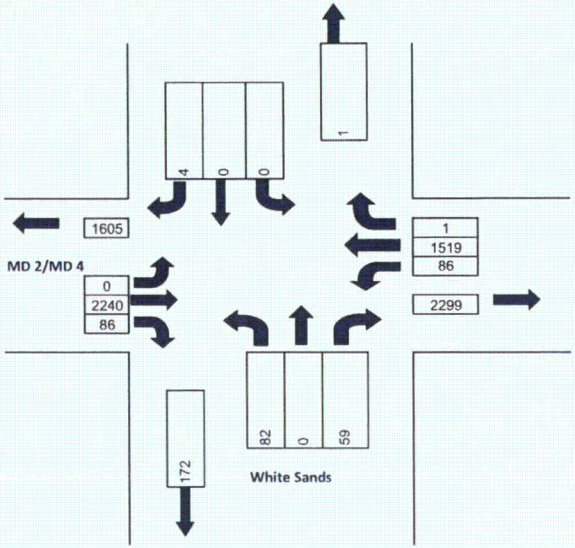
Total	1,546
LOS	E
V/C	0.97

AM Peak



Intersection Control :
X Signal ____ Stop ____ Ways

PM Peak



White Sands Drive & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS	Opposing Volume	PCE
0	A		
1000	B	0	1.1
1150	C	200	2
1300	D	600	3
1450	E	800	4
1600	F	1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	SBT	1,141	0.55	628	17	1	17	645
	EBTL	137	1.00	137	0	1	0	137

Remarks:
Right turns with a dedicated lane >150 ft are excluded

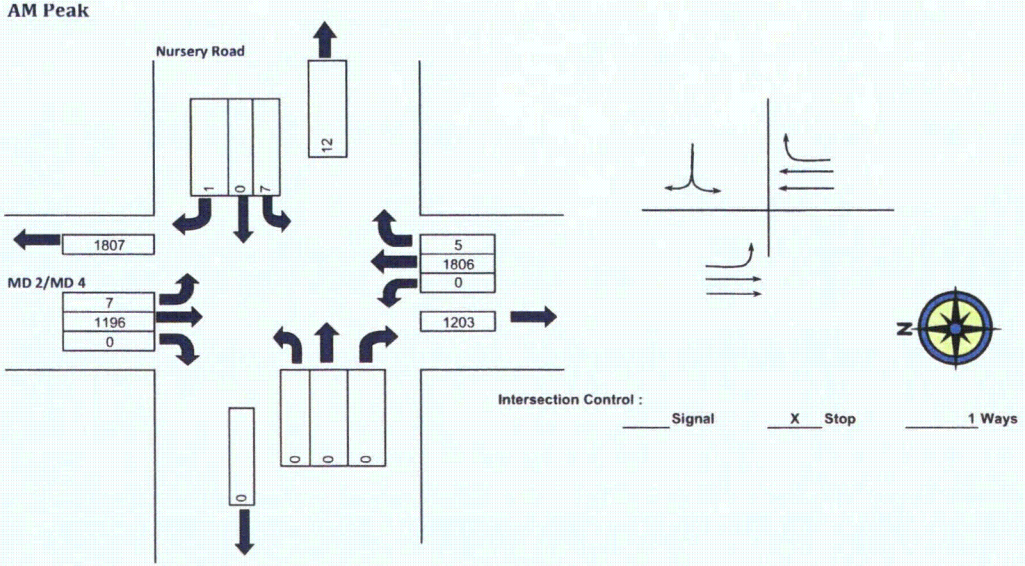
Critical Lane Volume — Total 782, LOS A, V/C 0.49

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	SBT	2,240	0.55	1232	86	1	86	1,318
	EBTL	82	1	82	0	1	0	82

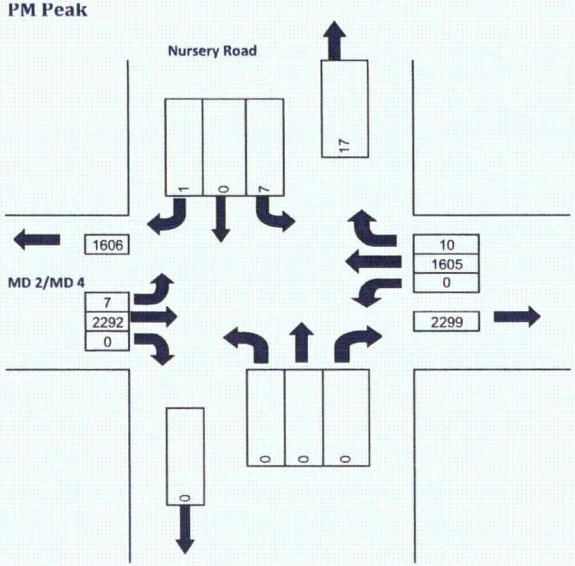
Remarks:
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 1,400, LOS D, V/C 0.87

AM Peak



PM Peak



Nursery Road & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS
0	A
1000	B
1150	C
1300	D
1450	E
1600	F

Opposing Volume	PCE
0	1.1
200	2
600	3
800	4
1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,806	0.55	993	7	1	7	1,000
	SBT	1,196	0.55	658	0	1	0	658
	WBLR	8	1	8	0	1	0	8

Remarks: Right turns with a dedicated lane >150 ft are excluded

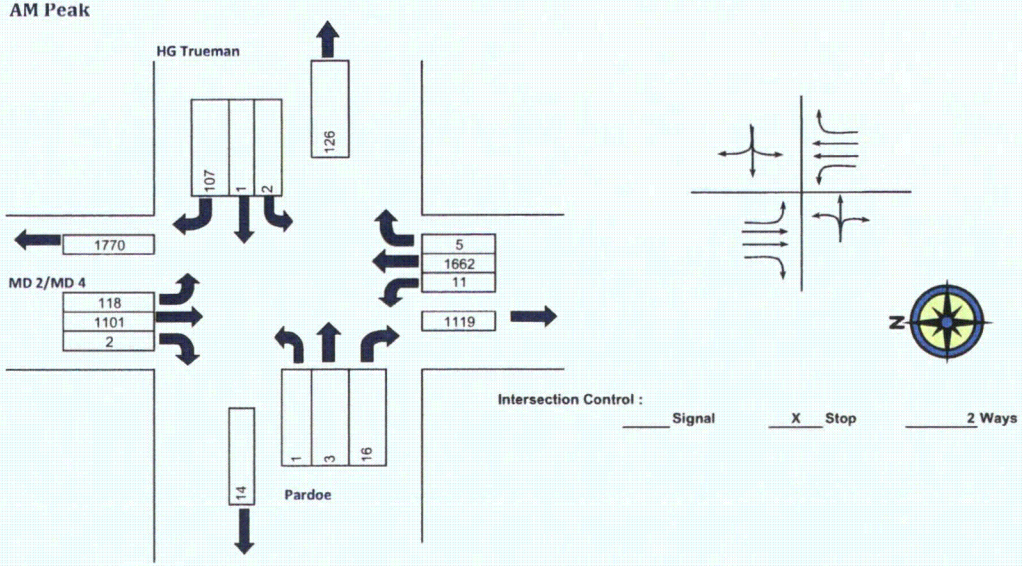
Critical Lane Volume: Total 1,008; LOS B; V/C 0.63

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,605	0.55	883	7	1	7	890
	SBT	2,292	0.55	1260	0	1	0	1,260
	WBLR	8	1	8	0	1	0	8

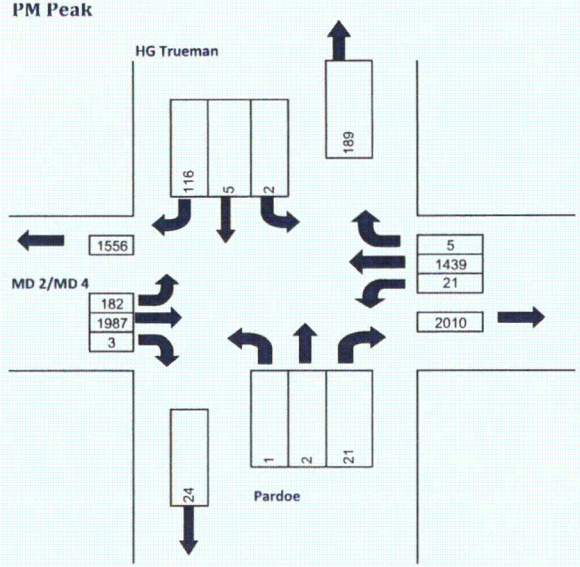
Remarks: Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume: Total 1,268; LOS C; V/C 0.79

AM Peak



PM Peak



Intersection Control :

____ Signal ___X___ Stop _____ 2 Ways

HG Trueman/Pardoe & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS	Opposing Volume	PCE
0	A		
1000	B	0	1.1
1150	C	200	2
1300	D	600	3
1450	E	800	4
1600	F	1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,662	0.55	914	118	1	118	1,032
	SBT	1,101	0.55	606	11	1	11	617
	EBLTR	20	1	20	0	1	0	20
	WBLTR	110	1	110	0	1	0	110

Remarks:
Right turns with a dedicated lane >150 ft are excluded

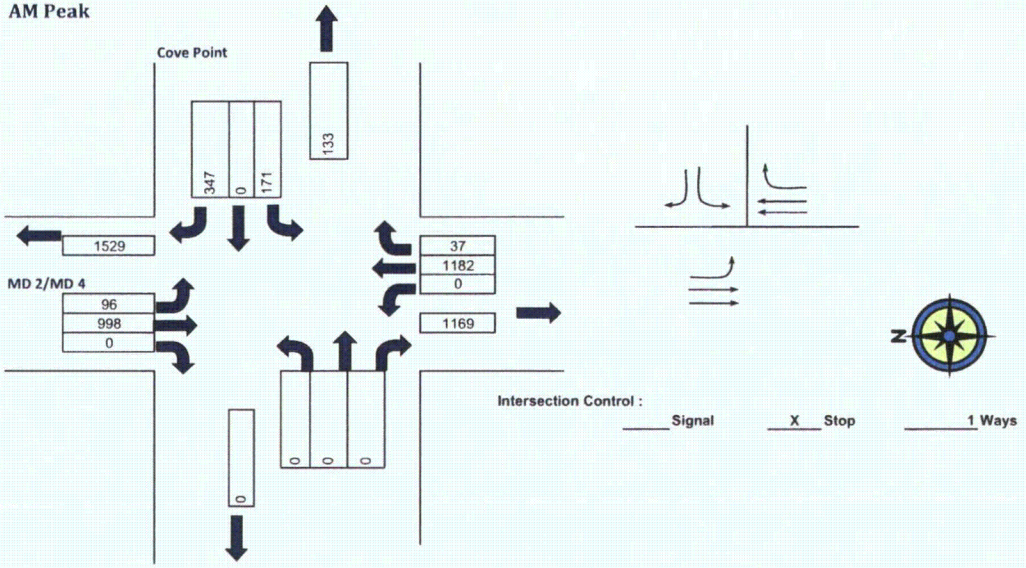
Critical Lane Volume — Total 1,162; LOS C; V/C 0.73

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,439	0.55	792	182	1	182	974
	SBT	1,987	0.55	1093	21	1	21	1,114
	EBLTR	24	1	24				24
	WBLTR	123	1	123	0	1	0	123

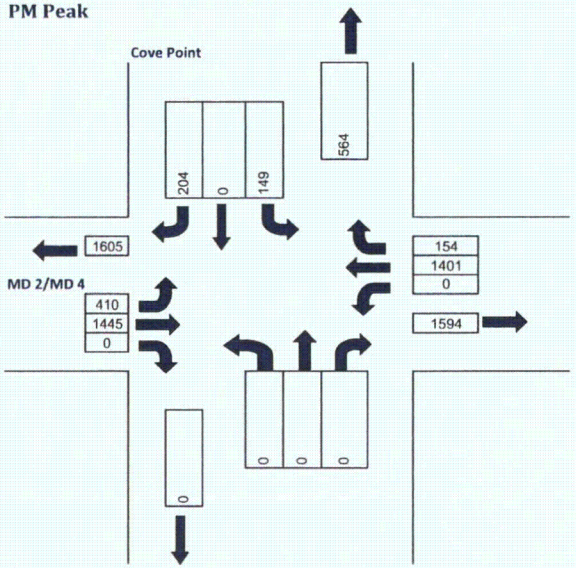
Remarks:
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 1,261; LOS C; V/C 0.79

AM Peak



PM Peak



Intersection Control :

____ Signal X Stop ____ 1 Ways

Cove Point Road & MD 2/MD 4

Construction, 2016, No Mitigation

KLD Engineering, P.C.

Lanes	LUF
1	1
2	0.55
3	0.4
4	0.3
Dbl LT	0.6

CLV	LOS	Opposing Volume	PCE
0	A		
1000	B	0	1.1
1150	C	200	2
1300	D	600	3
1450	E	800	4
1600	F	1000	5

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,182	0.55	650	96	1	96	746
	SBT	998	0.55	549	0	1	0	549
	WBL	171	1	171	0	1	0	171
	WBR	251	1	251	0	1	0	251

Remarks:
Some WBR Coincide with SBL
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 997; LOS A; V/C 0.62

	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
	NBT	1,401	0.55	770	410	1	410	1,180
	SBT	1,445	0.55	795	0	1	0	795
	WBL	149	1	149	0	1	0	149
	WBR	0	1	0	0	1	0	0

Remarks:
Some WBR Coincide with SBL
Right turns with a dedicated lane >150 ft are excluded

Critical Lane Volume — Total 1,329; LOS D; V/C 0.83

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 Diverge

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
SBL	2016	AM	F	3	165	79	1.00	79	3.6	5.1	126
SBL	2016	PM	F	3	165	176	1.00	176	8.1	11.3	282
800 feet of storage available (approximately)											
WBL	2016	AM	F	3	165	829	1.00	829	38.0	53.2	1329
WBL	2016	PM	F	3	165	908	1.00	908	41.6	58.2	1456
450 feet of storage available (approximately)											
NBT	2016	AM	F	3	165	1766	0.55	971	44.5	62.3	1558
NBT	2016	PM	F	3	165	1569	0.55	863	39.6	55.4	1385
950 feet of storage available (approximately) before NBT blocks NBR bypass lane at the Church Driveway											
	Queue length exceeds available storage										

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and MD 231

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
NBL	2016	AM	D	5	135	308	0.60	185	6.9	9.7	242
NBL	2016	PM	F	5	165	408	0.60	245	11.2	15.7	393
400 feet of storage available (approximately)											
SBL	2016	AM	D	5	135	71	0.60	43	1.6	2.2	56
SBL	2016	PM	F	5	165	61	0.60	37	1.7	2.3	59
400 feet of storage available (approximately)											
EBL	2016	AM	D	5	135	383	0.60	230	8.6	12.0	301
EBL*	2016	PM	F	5	165	407	0.60	244	11.2	15.7	391
385 feet of storage available (approximately)											
WBL	2016	AM	D	5	135	62	0.60	37	1.4	2.0	49
WBL	2016	PM	F	5	165	146	0.60	88	4.0	5.6	140
360 feet of storage available (approximately)											
	Queue length exceeds available storage										

* Note - Queue storage deficiency is addressed by proposed mitigation concepts

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and Calvert Beach Road

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
NBL	2016	AM	F	5	165	39	1.00	39	1.8	2.5	63
NBL	2016	PM	F	5	165	98	1.00	98	4.5	6.3	157
500 feet of storage available (approximately)											
SBL	2016	AM	F	5	165	33	1.00	33	1.5	2.1	53
SBL	2016	PM	F	5	165	71	1.00	71	3.3	4.6	114
575 feet of storage available (approximately)											
EBTL	2016	AM	F	5	165	75	1.00	75	3.4	4.8	120
EBTL	2016	PM	F	5	165	76	1.00	76	3.5	4.9	122
300 feet of storage available (approximately) before EBTL blocks the EBR bypass lane											
WBTL	2016	AM	F	5	165	149	1.00	149	6.8	9.6	239
WBTL	2016	PM	F	5	165	186	1.00	186	8.5	11.9	298
350 feet of storage available (approximately) before WBTL blocks the WBR bypass lane											
NBT	2016	AM	F	5	165	1424	0.55	783	35.9	50.2	1256
NBT	2016	PM	F	5	165	2588	0.55	1424	65.3	91.4	2284
SBT	2016	AM	F	5	165	2730	0.55	1501	68.8	96.3	2409
SBT	2016	PM	F	5	165	2465	0.55	1356	62.1	87.0	2175
	Queue length exceeds available storage										

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and Calvert Cliffs Parkway

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
SBL	2016	AM	A	3	100	59	1.00	59	1.6	2.3	57
SBL	2016	PM	E	3	150	5	1.00	5	0.2	0.3	7
600 feet of storage available (approximately)											
NBT	2016	AM	A	3	100	1507	0.55	829	23.0	32.2	806
NBT*	2016	PM	E	3	150	2802	0.55	1541	64.2	89.9	2248
1150 feet available prior to CC3 Access Road (approximately)											
	Queue length exceeds available storage										

* Note - Queue storage deficiency is addressed by proposed mitigation concept

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and White Sands Drive

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
NBL	2016	AM	A	3	100	17	1.00	17	0.5	0.7	17
NBL	2016	PM	D	3	135	86	1.00	86	3.2	4.5	113
550 feet of storage available (approximately)											
EBTL*	2016	AM	A	3	100	137	1.00	137	3.8	5.3	133
EBTL*	2016	PM	D	3	135	82	1.00	82	3.1	4.3	108
80 feet of storage available (approximately)											
SBT	2016	AM	A	3	100	1141	0.55	628	17.4	24.4	610
SBT	2016	PM	D	3	135	2240	0.55	1232	46.2	64.7	1617
1850 feet available prior to CC3 Access Road (approximately)											
	Queue length exceeds available storage										

* - Note that there are small storage deficiencies in the No-Build condition, Construction traffic is not loaded onto this approach.

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and Nursery Road

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
SBL	2016	AM	B	3	100	7	1.00	7	0.2	0.3	7
SBL	2016	PM	C	3	120	0	1.00	0	0.0	0.0	0
570 feet of storage available (approximately)											
	Queue length exceeds available storage										

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and Pardoe Road

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
SBL	2016	AM	C	5	120	118	1.00	118	3.9	5.5	138
SBL	2016	PM	C	5	120	182	1.00	182	6.1	8.5	212
570 feet of storage available (approximately)											
NBL	2016	AM	C	5	120	11	1.00	11	0.4	0.5	13
NBL	2016	PM	C	5	120	21	1.00	21	0.7	1.0	25
600 feet of storage available (approximately)											
	Queue length exceeds available storage										

Maryland SHA Queuing Analysis

Location: MD 2/MD 4 and Cove Point Road

Scenario	Year	Peak Hour	Level of Service	Number of Phases per Cycle	Cycle Length (sec)	Volume	Lane Use Factor	Critical Lane Volume	Average Vehicles per Cycle per Lane	Maximum Vehicles per Cycle per Lane	Max Queue Length per Cycle per Lane (ft)
Construction, 2016, No Mitigation											
SBL	2016	AM	A	3	100	96	1.00	96	2.7	3.7	93
SBL	2016	PM	D	3	135	410	1.00	410	15.4	21.5	538
550 feet of storage available (approximately)											
WBL	2016	AM	A	3	100	171	1.00	171	4.8	6.7	166
WBL	2016	PM	D	3	135	149	1.00	149	5.6	7.8	196
300 feet of storage available (approximately)											
	Queue length exceeds available storage										