

**Appendix H**  
**Projected Conditions During No-Build and Construction With**  
**Mitigation**

**LOS Analysis Worksheets**

This appendix contains CLV worksheets for all calculations shown in Table H-1, queue calculations using SHA methodology and analysis of additional design concepts at the MD 2 & MD 4 diverge which were disregarded. Figure H-1 presents the traffic volumes and turning movements at the study intersections during the AM and PM peak hours. Figure H-2 shows added construction traffic only. There are intersection drawings for each of the mitigation concepts.

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

Intersection	Mitigation Detail	2010		2016			
		Existing		No-Build		Construction	
		AM	PM	AM	PM	AM	PM
MD 2 and MD 4	None	1344	1176	1514	1325	1879	1946
	Concept 1: Remove Maryland-T, add 1 SBT and 1 WBL lane			1328	1280	1547	1583
	Concept 2: Remove Maryland-T, add 1 SBT and 2 WBL lanes			1259	1176	1423	1447
MD 2/MD 4 and MD 231	None	865	1098	974	1236	1331	1640
	Option 1: Restripe EB thru lane as left+thru, add receiver for EB right, add 1 SBT lane, restripe left lane on WB approach as shared thru+left, add an exclusive westbound right turn lane			941	1019	1092	1367
	Option 2: Restripe EB thru lane as left+thru, add receiver for EB right, restripe left lane on WB approach as shared thru+left, add an exclusive westbound right turn lane			941	1193	1297	1597
	Option 3: Add 1 WBT lane			932	1166	1288	1571
MD 2/MD 4 and Calvert Beach	None	952	1148	1040	1248	1764	1757
	Add one SBT and one NBT lane			827	1006	1355	1368
MD 2/MD 4 and Calvert Cliffs	None	837	710	930	796	888	1592
	Add one NBT lane, Prohibit WBL turn			704	595	662	1172
MD 2/MD 4 and CC3 Access Road*	Create temporary intersection					54.4	52.5
MD 2/MD 4 and White Sands Drive	None	708	1080	782	1199	782	1400
MD 2/MD 4 and Nursery Road	None	715	949	808	1068	1008	1268
MD 2/MD 4 and Pardoe Road	None	881	961	961	1061	1162	1261
MD 2/MD 4 and Cove Point Road	None	746	1139	800	1212	997	1329

Note: Highlighted cells correspond to locations that have a CLV greater than 1450

\* Values reported for CC3 Access Road reflect Synchro HCM delay (sec/vehicle) for the NBT movement

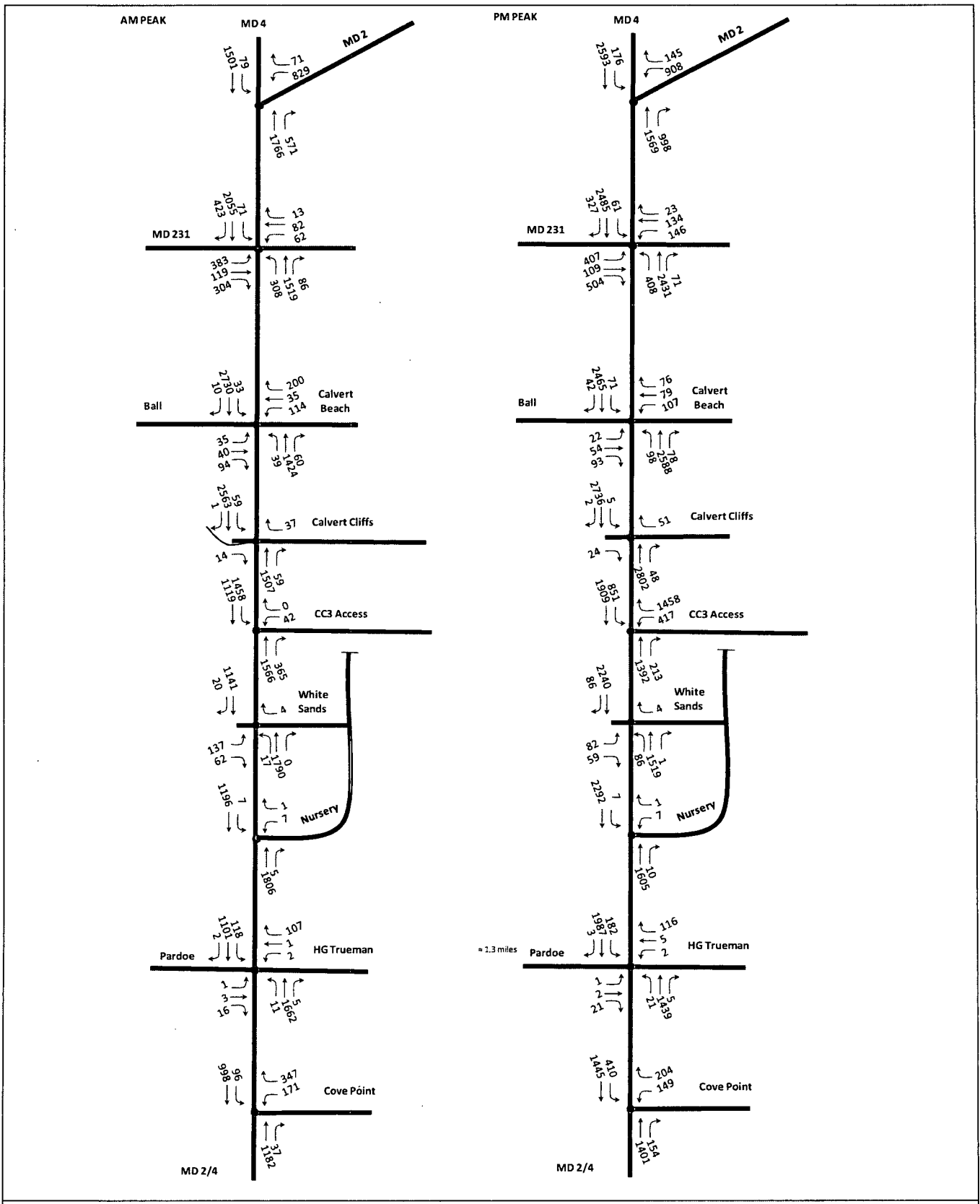


Figure H-1 – Peak Hour Traffic Volumes - Construction Peak Conditions (2016)

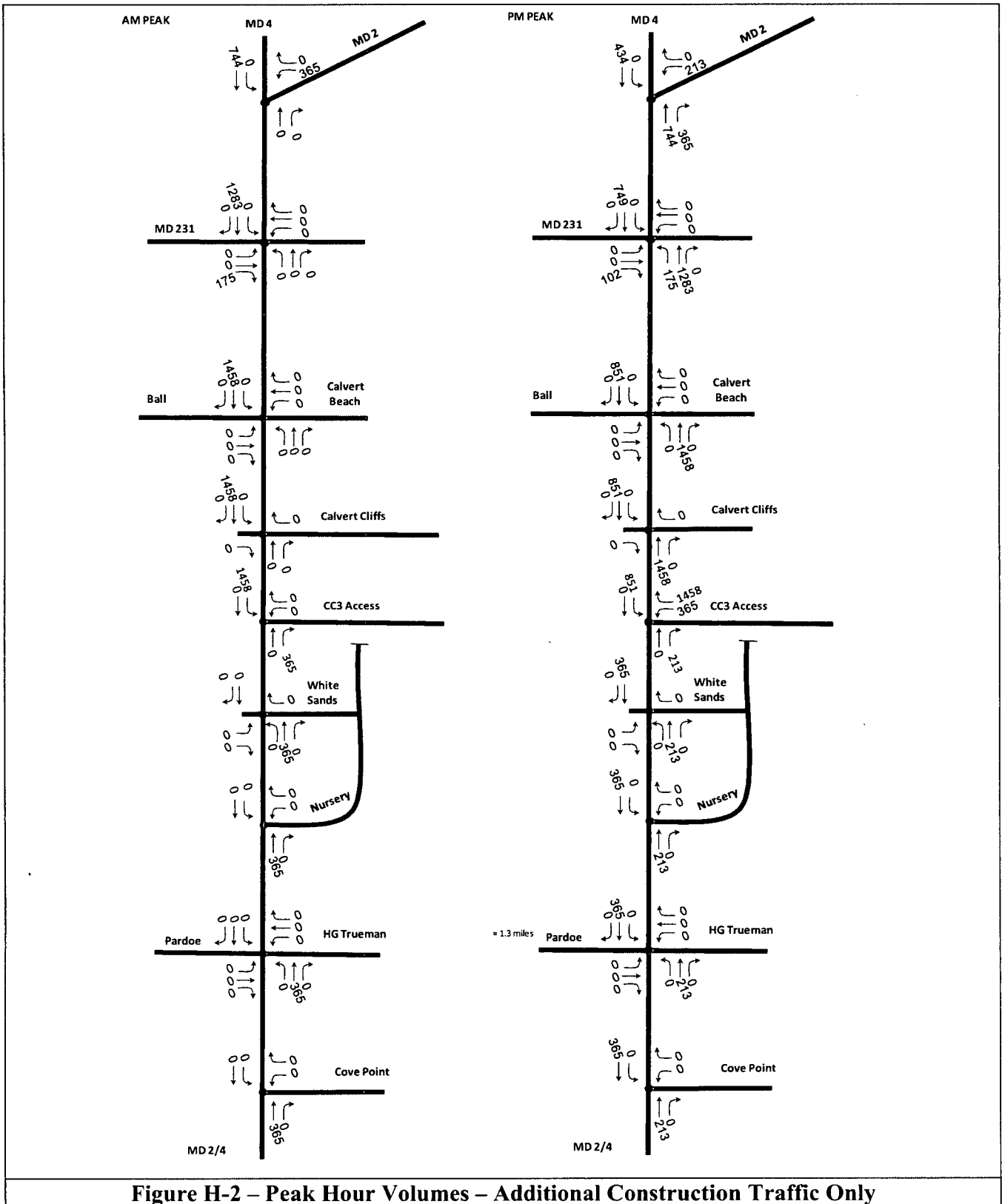
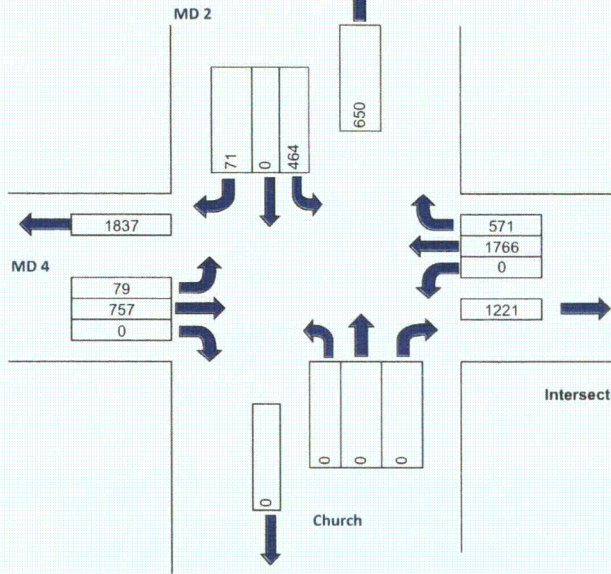
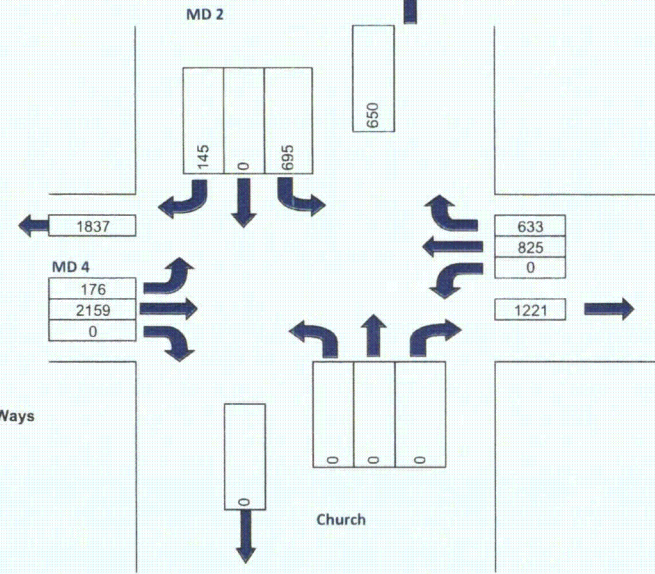


Figure H-2 – Peak Hour Volumes – Additional Construction Traffic Only

AM Peak



PM Peak



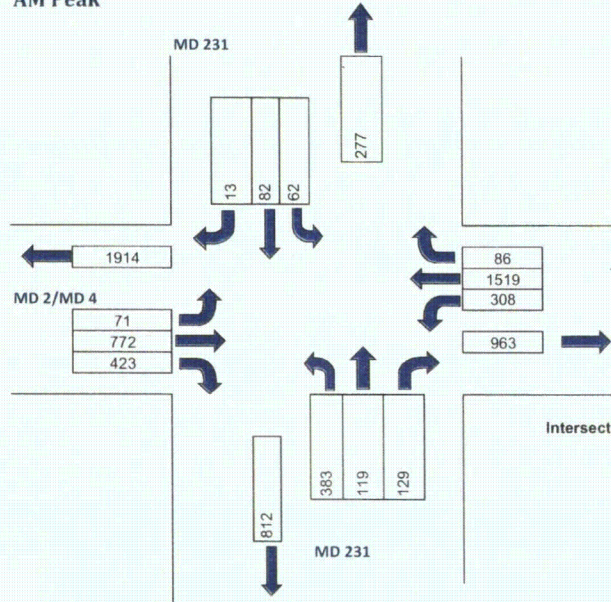
Intersection Control :  Signal  Stop  Ways

MD 2/MD 4 Diverge  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

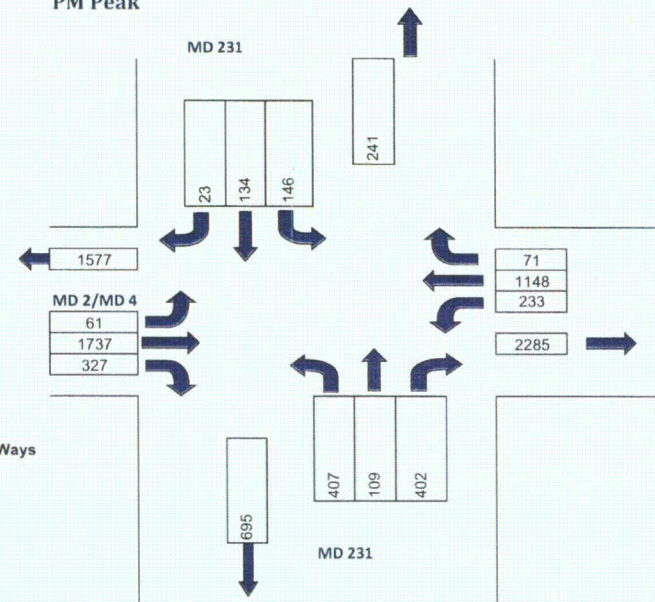
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	NBT	825	0.55	454	176	1	176	630
WBL	464	1	464	0	1	0	464	WBL	695	1	695	0	1	0	695
Remarks: NBR has RTOR, is concurrent with WBL								Remarks: NBR has RTOR, is concurrent with WBL							
Critical Lane Volume Total LOS E 1,514								Critical Lane Volume Total LOS D 1,325							

AM Peak



PM Peak



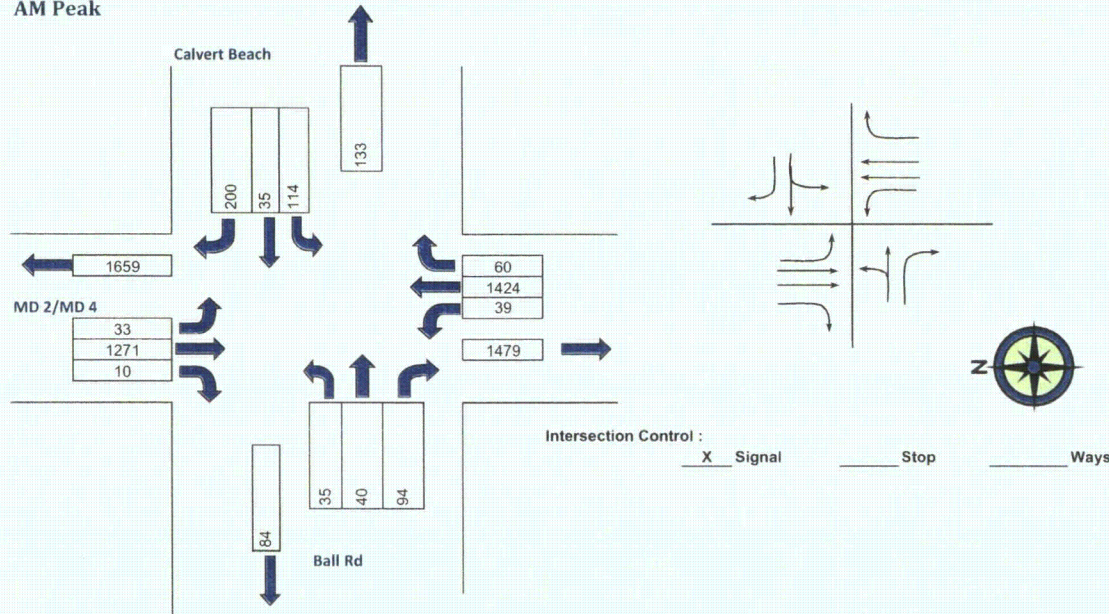
Intersection Control :  Signal  Stop  Ways

MD 231 & MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

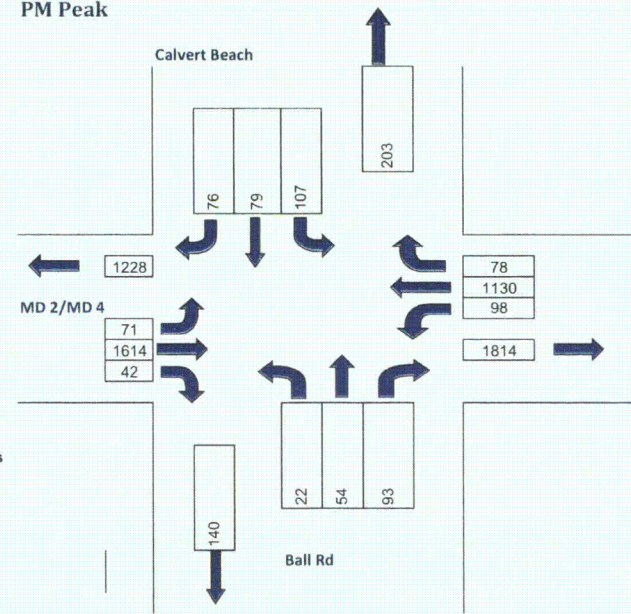
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbi LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	NBT	1,148	0.4	459	61	0.6	37	496
SBT	772	0.40	309	308	0.6	185	493	SBT	1,737	0.4	695	233	0.6	140	835
EBL	383	0.60	230	0	1	0	230	EBL	407	0.6	244	0	1	0	244
WBTR	94	1	94	0	1	0	94	WBTR	157	1	157	0	1	0	157
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded								Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded							
Critical Lane Volume Total LOS A 974								Critical Lane Volume Total LOS C 1,236							

**AM Peak**



**PM Peak**

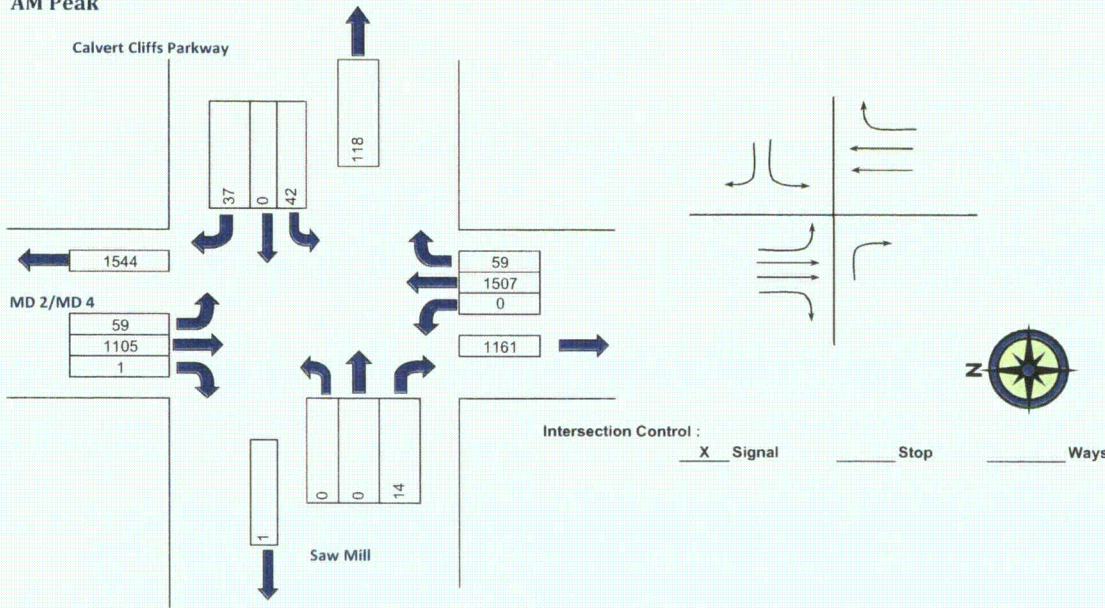


Calvert Beach/Ball Road &  
MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

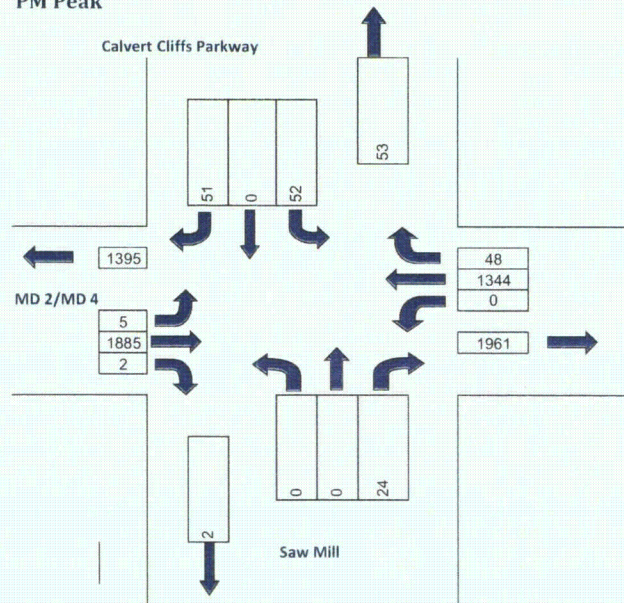
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	NBT	1,130	0.55	622	71	1	71	693		
SBT	1,271	0.55	699	39	1	39	738	SBT	1,614	0.55	888	98	1	98	986		
EBTL	75	1.00	75	0	1	0	75	EBTL	76	1	76	0	1	0	76		
WBTL	149	1	149	0	1	0	149	WBTL	186	1	186	0	1	0	186		
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded								Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded									
Critical Lane Volume				Total LOS B				1,040	Critical Lane Volume				Total LOS C				1,248

**AM Peak**



**PM Peak**



Calvert Cliffs Parkway & MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	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)	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	NBT	1,344	0.55	739	5	1	5	744
WBR	0	1	0	0	1	0	0	WBR	46	1	46	0	1	0	46
WBL	42	1	42	0	1	0	42	WBL	52	1	52	0	1	0	52

Remarks: WBR = 37 - 59 < 0  
Right turns with a dedicated lane >150 ft are excluded

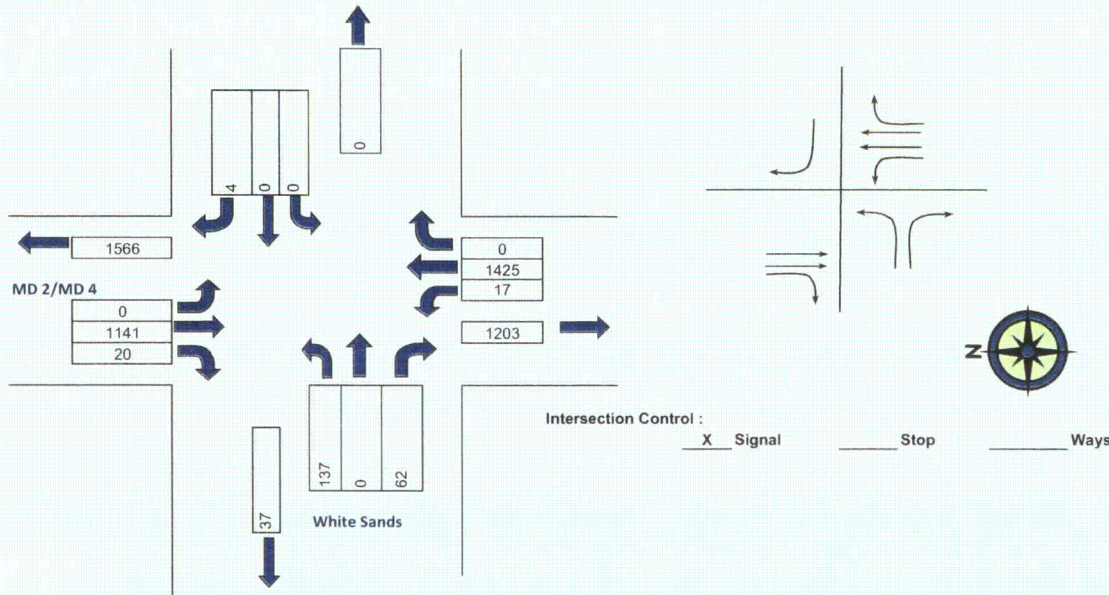
Critical Lane Volume  
Total LOS A 930

Remarks: WBR = 51 - 5  
Right turns with a dedicated lane >150 ft are excluded

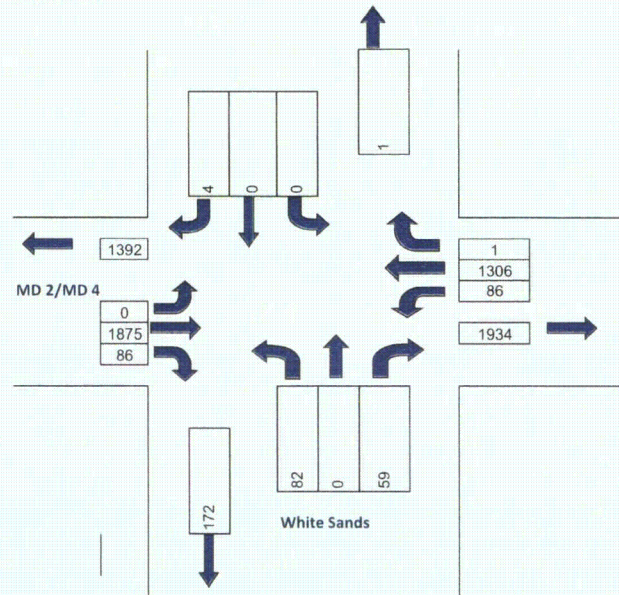
Critical Lane Volume  
Total LOS A 796



AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

White Sands Drive & MD 2/MD 4

Background, 2016, No Mitigation

KLD Engineering, P.C.

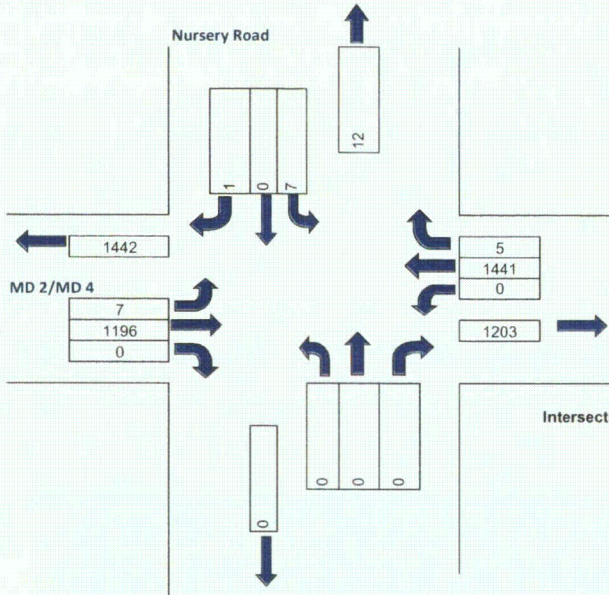
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbi LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	SBT	1,875	0.55	1031	86	1	86	1,117
EBTL	137	1.00	137	0	1	0	137	EBTL	82	1	82	0	1	0	82

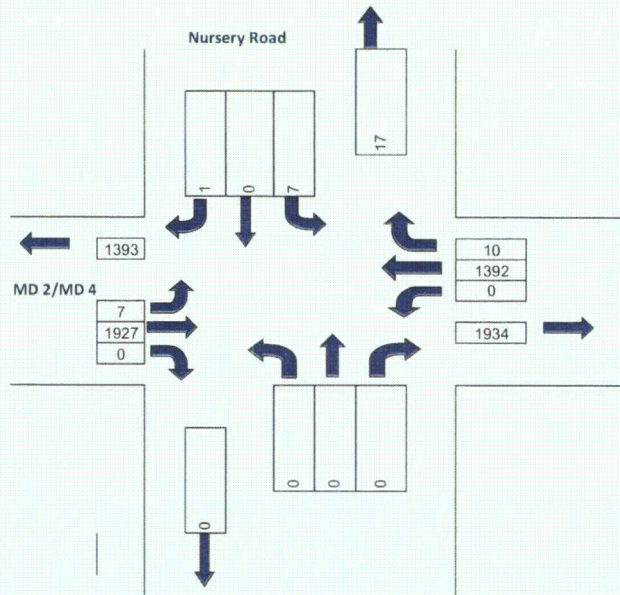
Remarks: Critical Lane Volume Total 782  
 Right turns with a dedicated lane >150 ft are excluded LOS A

Remarks: Critical Lane Volume Total 1,199  
 Right turns with a dedicated lane >150 ft are excluded LOS C

AM Peak



PM Peak



Intersection Control :  Signal  Stop  1 Ways

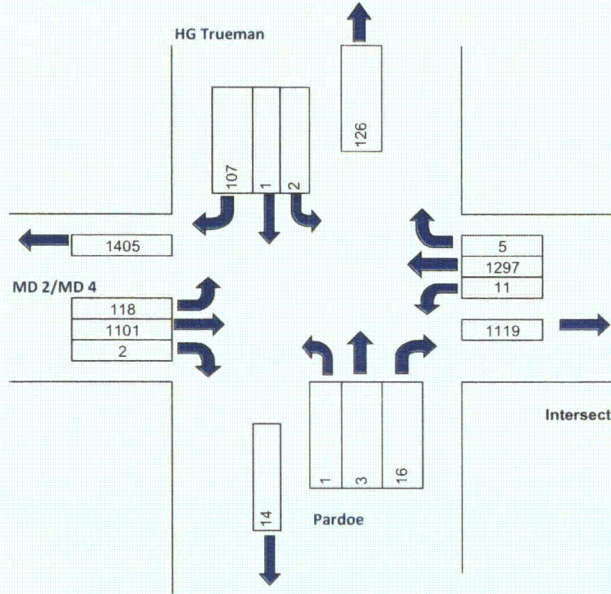
Nursery Road & MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbi LT	0.6	1450	E	800	4
		1600	F	1000	5

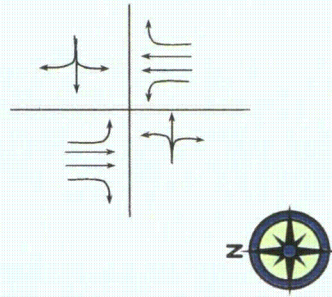
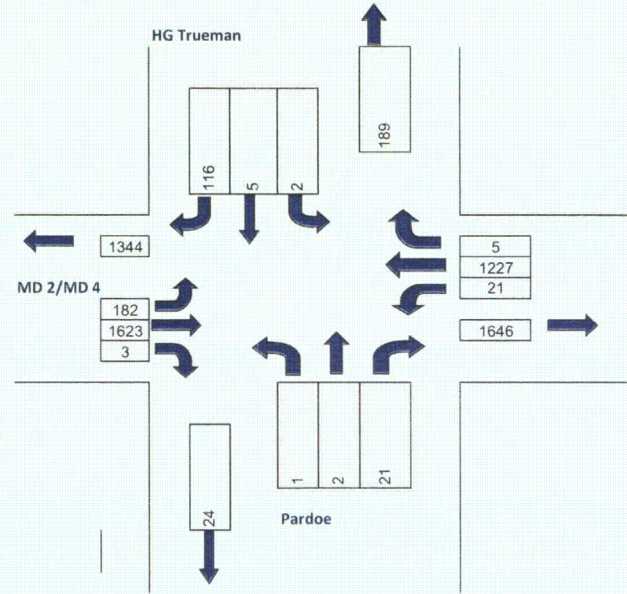
Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
NBT	1,441	0.55	793	7	1	7	800	NBT	1,392	0.55	766	7	1	7	773
SBT	1,196	0.55	658	0	1	0	658	SBT	1,927	0.55	1060	0	1	0	1,060
WBLR	8	1	8	0	1	0	8	WBLR	8	1	8	0	1	0	8

Remarks: Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS A	808	Remarks: Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS B	1,068
--	--	-----	--	--	-------

AM Peak



PM Peak



Intersection Control :        Signal   X   Stop        2 Ways

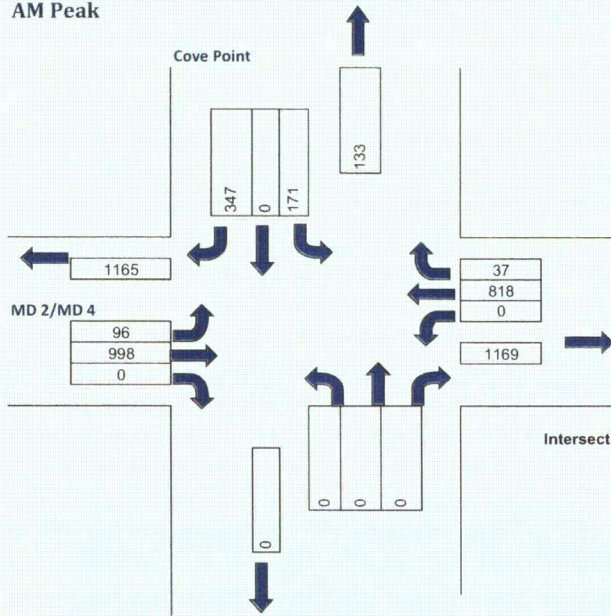
HG Trueman/Pardoe & MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbi LT	0.6	1450	E	800	4
		1600	F	1000	5

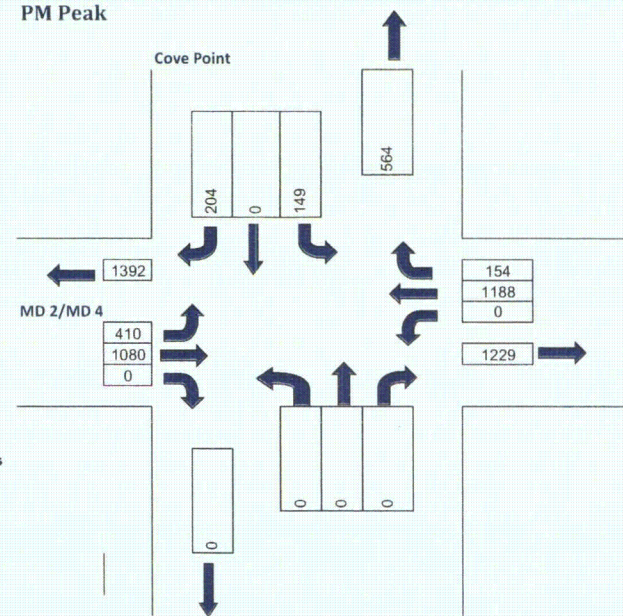
Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
NBT	1,297	0.55	713	118	1	118	831	NBT	1,227	0.55	675	182	1	182	857
SBT	1,101	0.55	606	11	1	11	617	SBT	1,623	0.55	893	21	1	21	914
EBLTR	20	1	20	0	1	0	20	EBLTR	24	1	24				24
WBLTR	110	1	110	0	1	0	110	WBLTR	123	1	123	0	1	0	123

Remarks: Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS A	961	Remarks: Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS B	1,061
--	--	-----	--	--	-------

AM Peak



PM Peak



Intersection Control :  Signal  Stop  1 Ways



Cove Point Road & MD 2/MD 4  
Background, 2016, No Mitigation  
KLD Engineering, P.C.

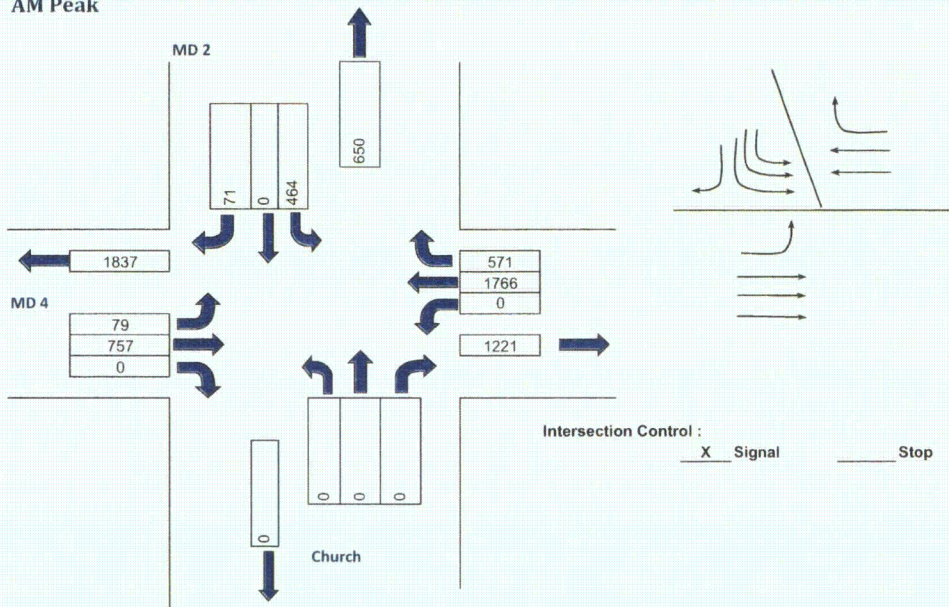
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	818	0.55	450	96	1	96	546	NBT	1,188	0.55	653	410	1	410	1,063
SBT	998	0.55	549	0	1	0	549	SBT	1,080	0.55	594	0	1	0	594
WBL	171	1	171	0	1	0	171	WBL	149	1	149	0	1	0	149
WBR	251	1	251	0	1	0	251	WBR	0	1	0	0	1	0	0

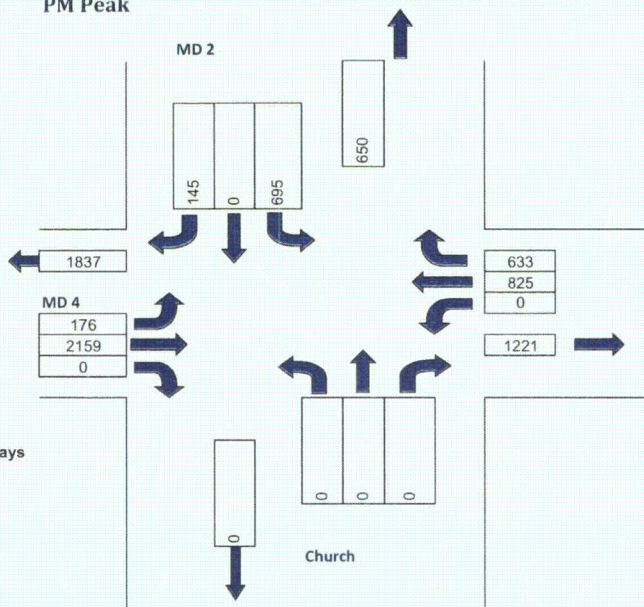
Remarks: Some WBR Coincide with SBL  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS A 800

Remarks: Some WBR Coincide with SBL  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS C 1,212

**AM Peak**



**PM Peak**



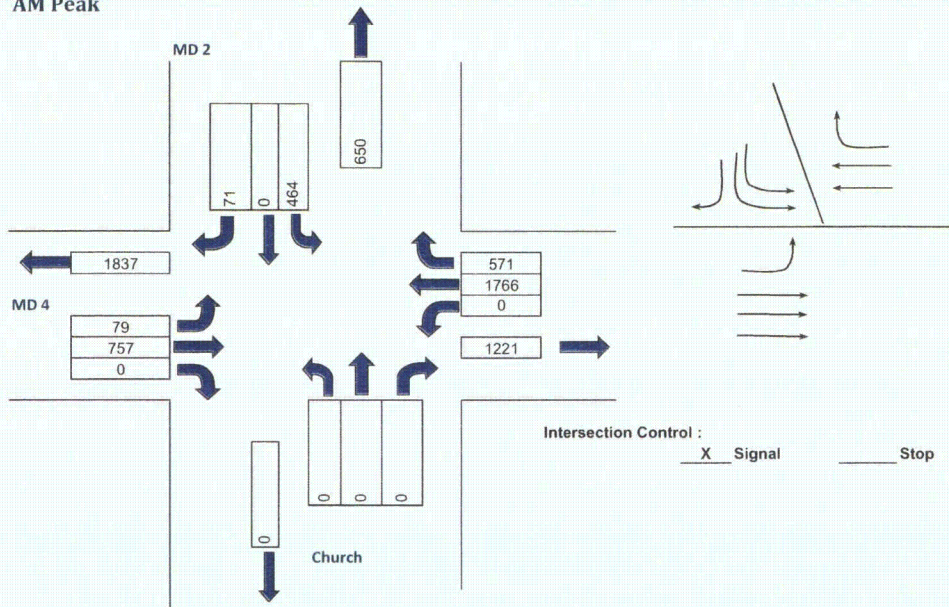
Intersection Control :  Signal     Stop     Ways

MD 2/MD 4 Diverge  
(Concept 2)  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

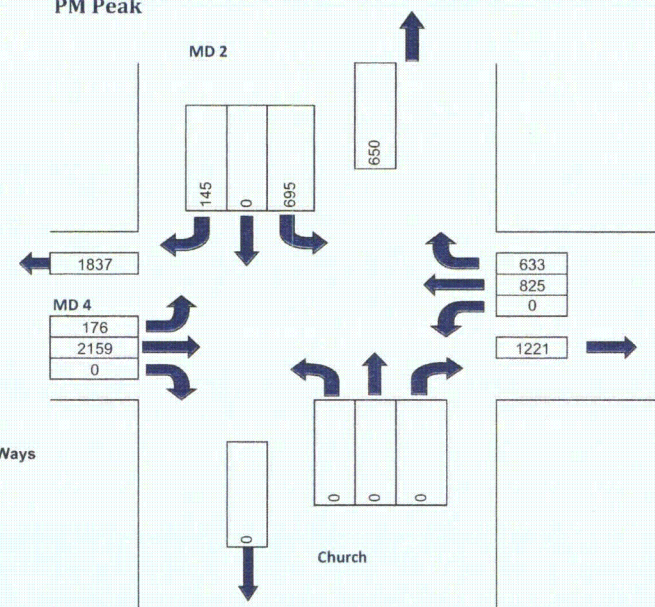
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	1.00	79	1,050	NBT	825	0.55	454	176	1.00	176	630
SBT	757	0.40	303	0	1.00	0	303	SBT	2,159	0.40	864	0	1.00	0	864
WBL	464	0.45	209	0	1.00	0	209	WBL	695	0.45	313	0	1.00	0	313
Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume	Total	1,259		Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume	Total	1,176	
					LOS	C							LOS	C	

AM Peak



PM Peak



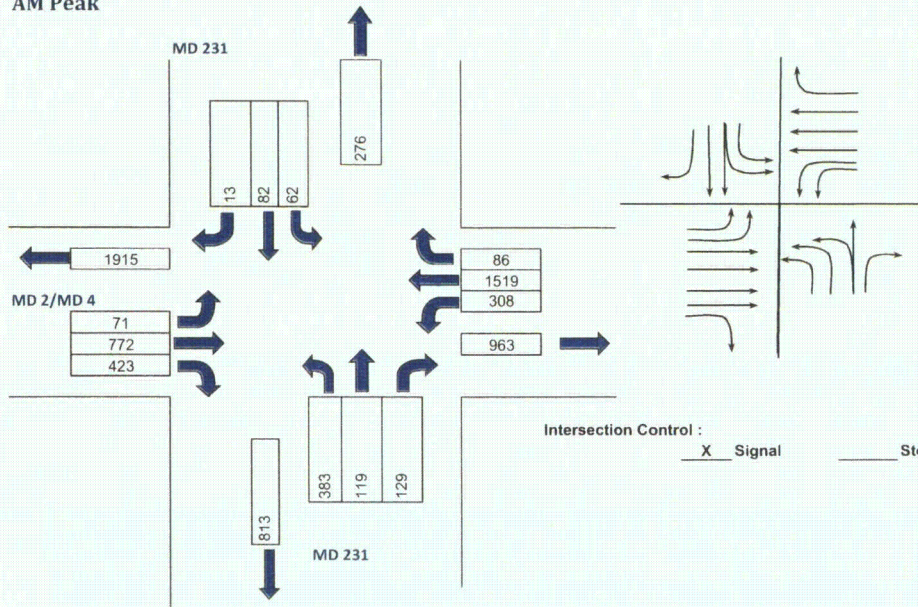
Intersection Control :  Signal  Stop  Ways

MD 2/MD 4 Diverge  
(Concept 1)  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

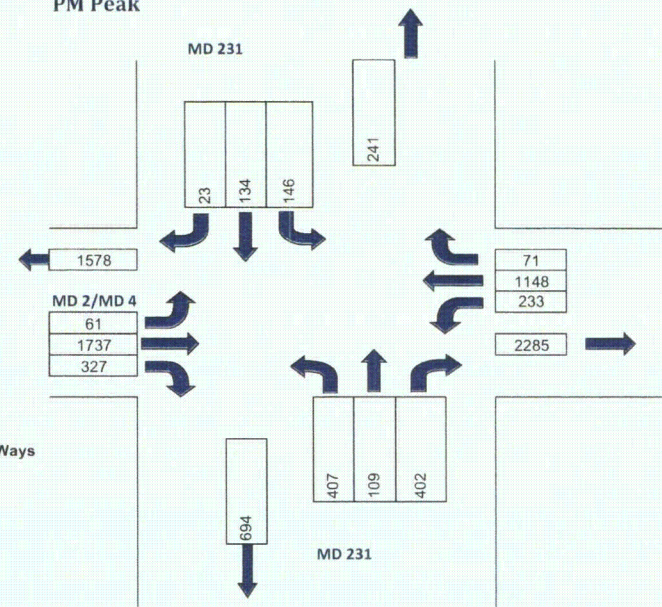
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	1.00	79	1,050	NBT	825	0.55	454	176	1.00	176	630
SBT	757	0.40	303	0	1.00	0	303	SBT	2,159	0.40	864	0	1.00	0	864
WBL	464	0.60	278	0	1.00	0	278	WBL	695	0.60	417	0	1.00	0	417
Critical Lane Volume				Total LOS D 1,328				Critical Lane Volume				Total LOS C 1,280			
Right turns with a dedicated lane >150 ft are excluded								Right turns with a dedicated lane >150 ft are excluded							

AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

MD 231 & MD 2/MD 4  
(Option 1)  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

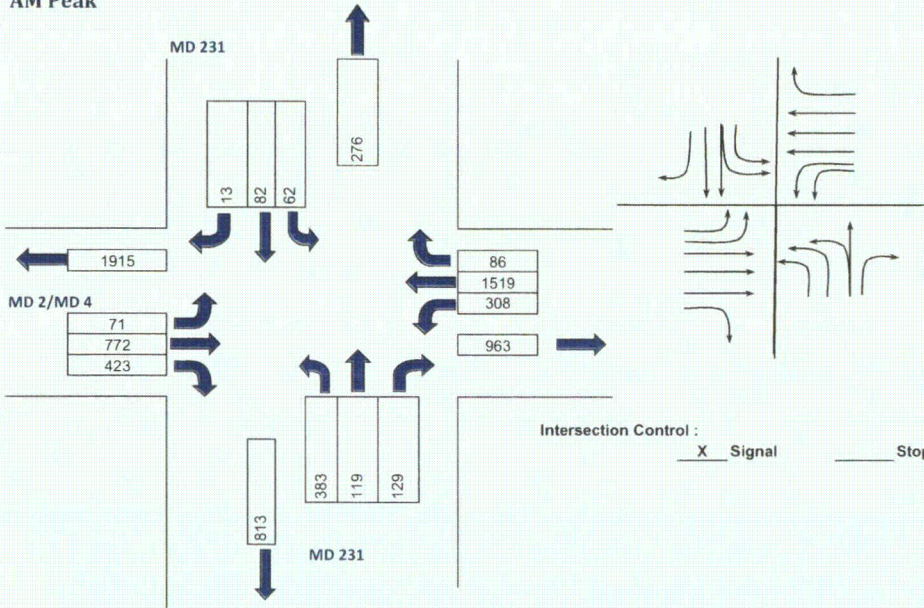
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	608	71	0.60	43	650	NBT	1,148	0.40	459	61	0.60	37	496
SBT	772	0.30	232	308	0.60	185	416	SBT	1,737	0.30	521	233	0.60	140	661
EBTL	502	0.45	226	0	1.00	0	226	EBTL	516	0.45	232	0	1.00	0	232
WBTL	144	0.45	65	0	1.00	0	65	WBTL	280	0.45	126	0	1.00	0	126

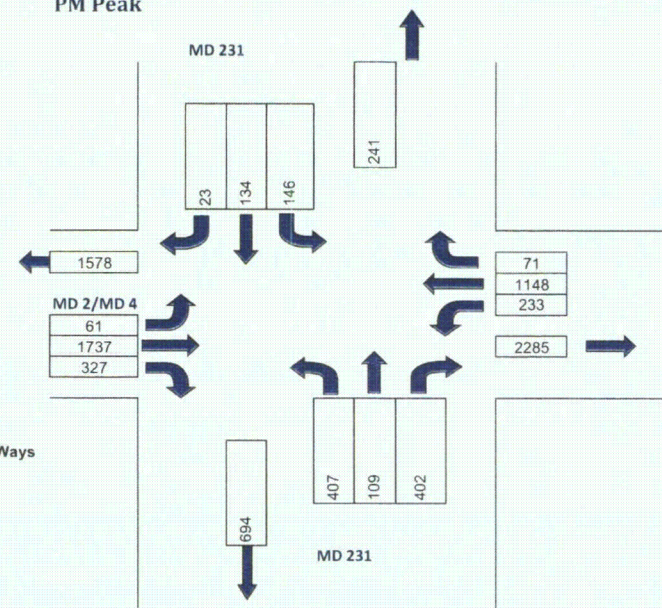
Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS A 941

Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS B 1,019

AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways



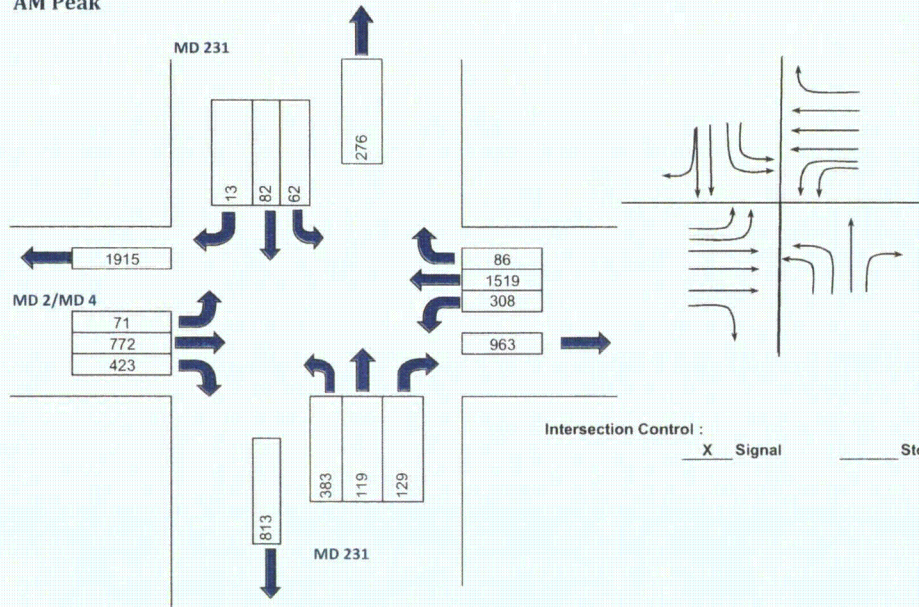
MD 231 & MD 2/MD 4  
(Option 2)  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
DbI LT	0.6	1450	E	800	4
		1600	F	1000	5

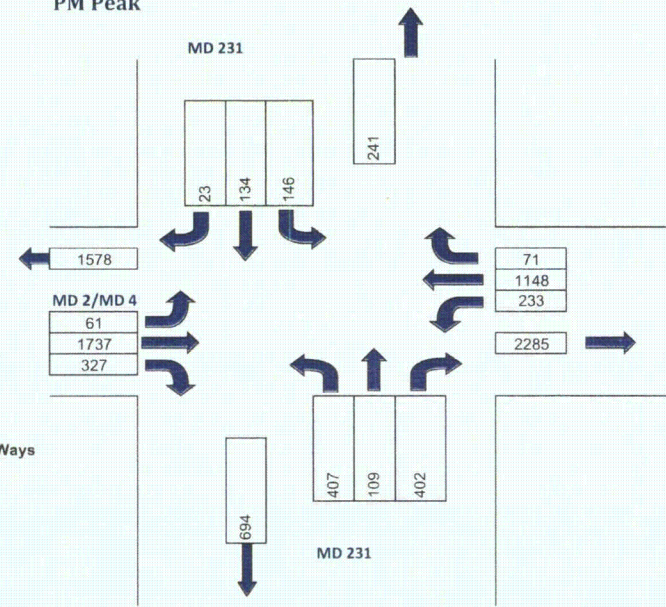
Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	
NBT	1,519	0.40	608	71	0.60	43	650	NBT	1,148	0.40	459	61	0.60	37	496	
SBT	772	0.40	309	308	0.60	185	494	SBT	1,737	0.40	695	233	0.60	140	835	
EBTL	502	0.45	226	0	1.00	0	226	EBTL	516	0.45	232	0	1.00	0	232	
WBTL	144	0.45	65	0	1.00	0	65	WBTL	280	0.45	126	0	1.00	0	126	
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total LOS A				941	Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total LOS C			



AM Peak



PM Peak



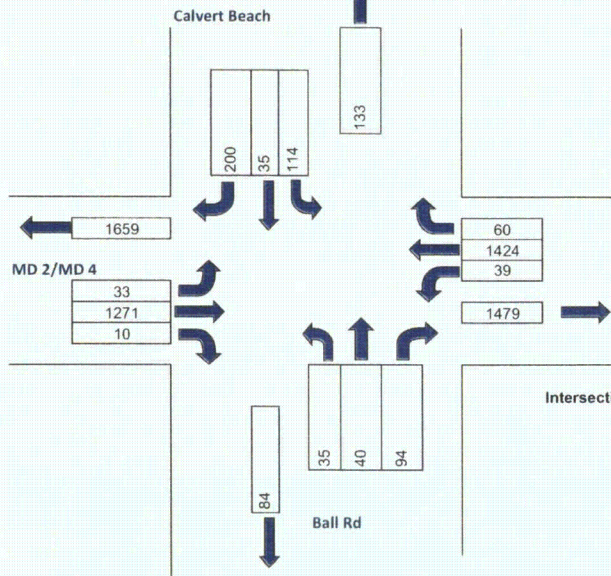
Intersection Control :  Signal  Stop  Ways

MD 231 & MD 2/MD 4  
(Option 3)  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

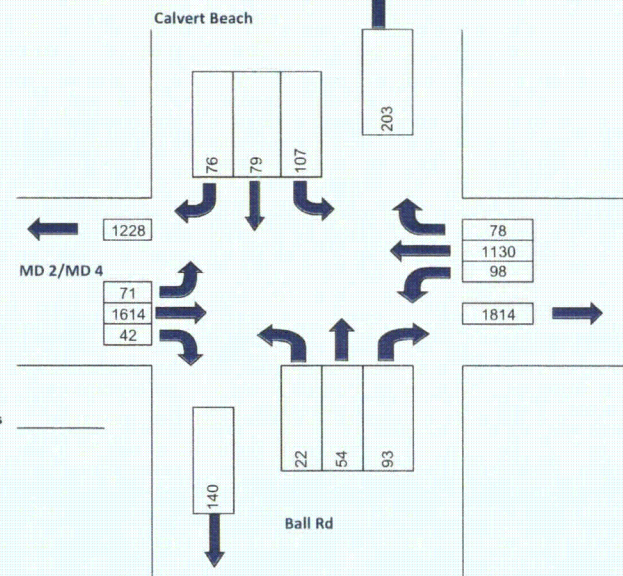
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
DbL LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	608	71	0.60	43	650	NBT	1,148	0.40	459	61	0.60	37	496
SBT	772	0.40	309	308	0.60	185	494	SBT	1,737	0.40	695	233	0.60	140	835
EBL	383	0.60	230	0	1.00	0	230	EBL	407	0.60	244	0	1.00	0	244
WBTR	95	0.55	52	0	1.00	0	52	WBTR	157	0.55	86	0	1.00	0	86
WBL	62	0.60	37	0	1.00	0	37	WBL	146	0.60	88	0	1.00	0	88
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total 932 LOS A				Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total 1,166 LOS C			

AM Peak



PM Peak

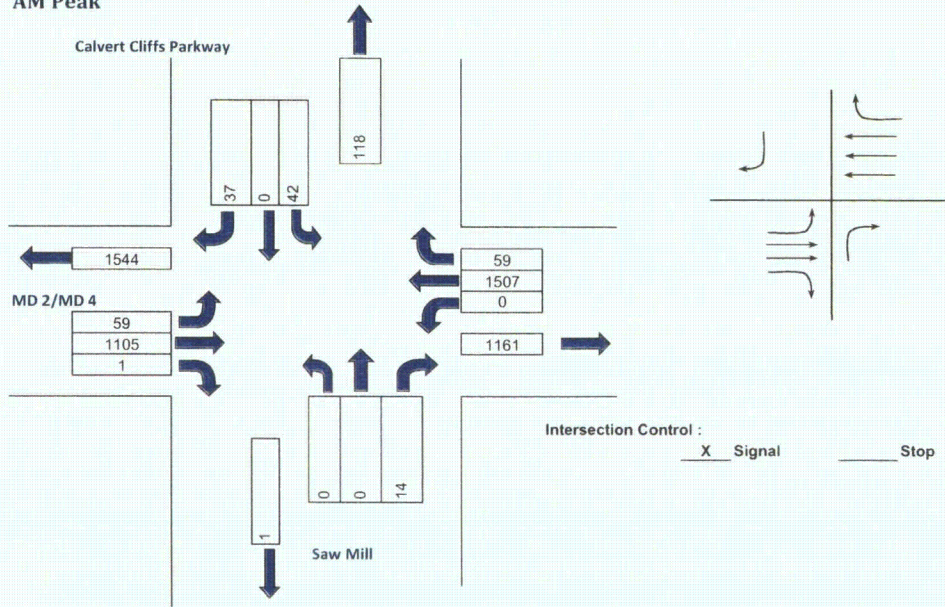


Calvert Beach/Ball Road &  
MD 2/MD 4  
No Build, 2016, With Mitigation  
KLD Engineering, P.C.

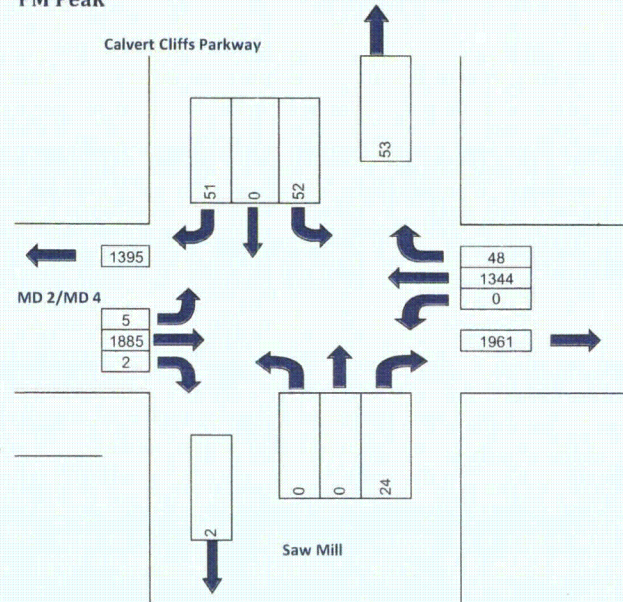
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbi LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	0.40	570	33	1.00	33	603	NBT	1,130	0.40	452	71	1.00	71	523
SBT	1,271	0.40	508	39	1.00	39	547	SBT	1,614	0.40	646	98	1.00	98	744
EBTL	75	1.00	75	0	1.00	0	75	EBTL	76	1.00	76	0	1.00	0	76
WBTL	149	1.00	149	0	1.00	0	149	WBTL	186	1.00	186	0	1.00	0	186
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded								Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded							
Critical Lane Volume Total LOS A 827								Critical Lane Volume Total LOS B 1,006							

**AM Peak**



**PM Peak**



Intersection Control :  Signal  Stop  Ways

Calvert Cliffs Parkway &  
MD 2/MD 4  
No Build, 2016, With Mitigation

KLD Engineering, P.C.

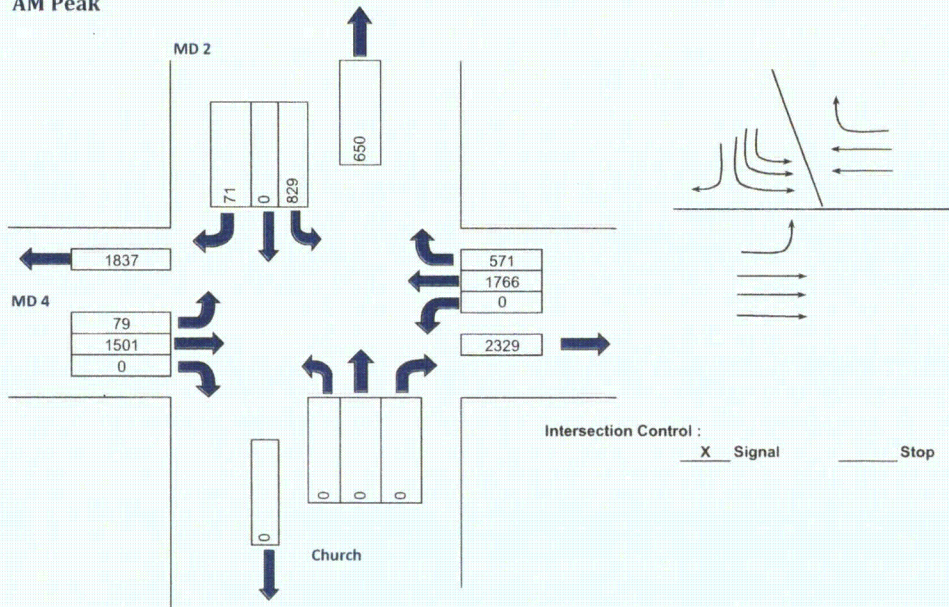
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
DbI LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	0.40	603	59	1	59	662	NBT	1,344	0.4	538	5	1	5	543
WBR	0	1.00	0	0	1.00	0	0	WBR	46	1.00	46	0	1.00	0	46
WBL	42	1.00	42	0	1.00	0	42	WBL	52	1.00	52	0	1.00	0	52

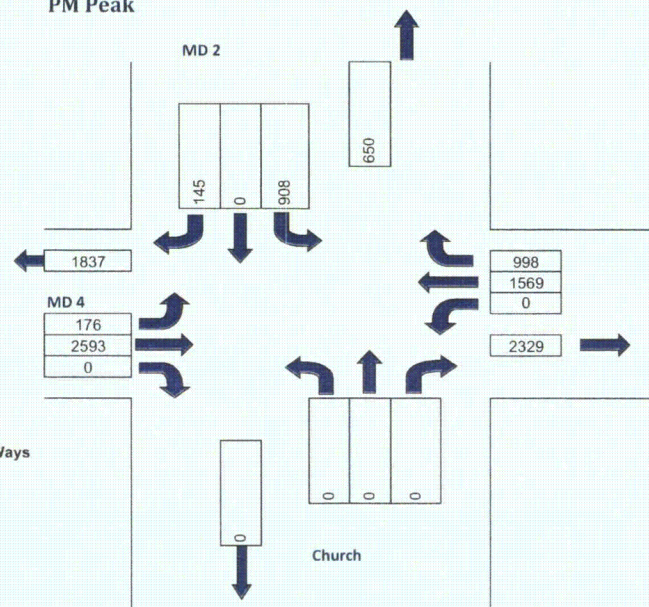
Remarks: WBR = 37 - 59 < 0 Critical Lane Volume Total 704  
Right turns with a dedicated lane >150 ft are excluded LOS A

Remarks: WBR = 51 - 5 Critical Lane Volume Total 595  
Right turns with a dedicated lane >150 ft are excluded LOS A

AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

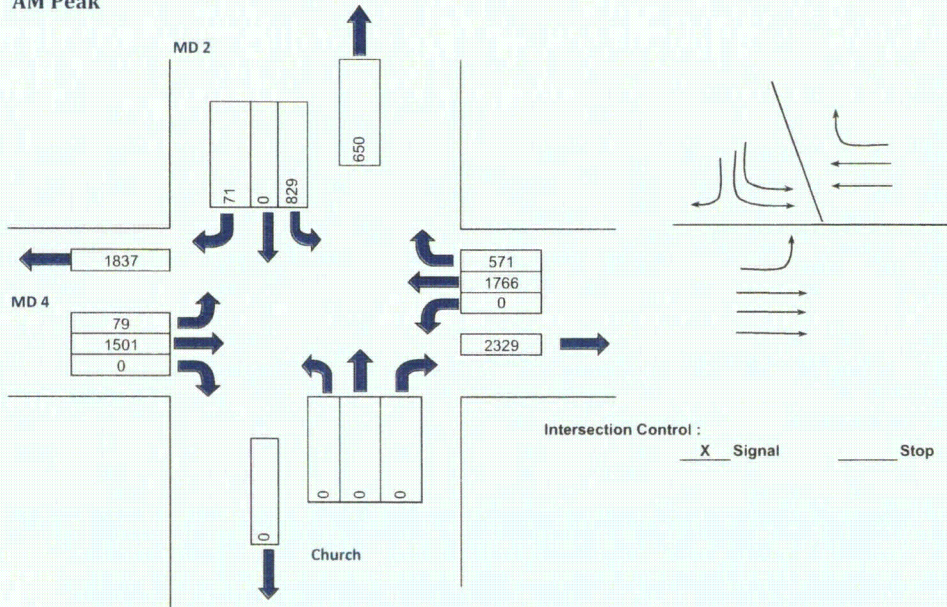
MD 2/MD 4 Diverge  
(Concept 2)  
Construction, 2016, With Mitigation

KLD Engineering, P.C.

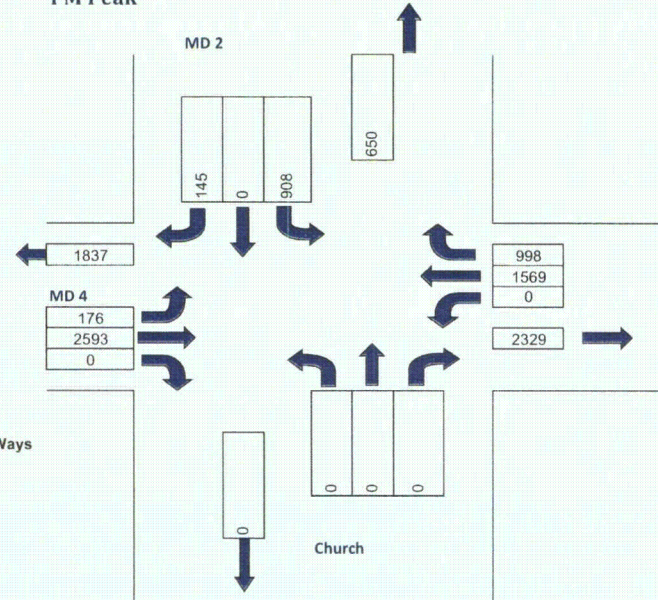
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	1.00	79	1,050	NBT	1,569	0.55	863	176	1.00	176	1,039
SBT	1,501	0.40	600	0	1.00	0	600	SBT	2,593	0.40	1037	0	1.00	0	1,037
WBL	829	0.45	373	0	1.00	0	373	WBL	908	0.45	408	0	1.00	0	408
Right turns with a dedicated lane >150 ft are excluded Critical Lane Volume Total LOS D 1,423								Right turns with a dedicated lane >150 ft are excluded Critical Lane Volume Total LOS D 1,447							

**AM Peak**



**PM Peak**



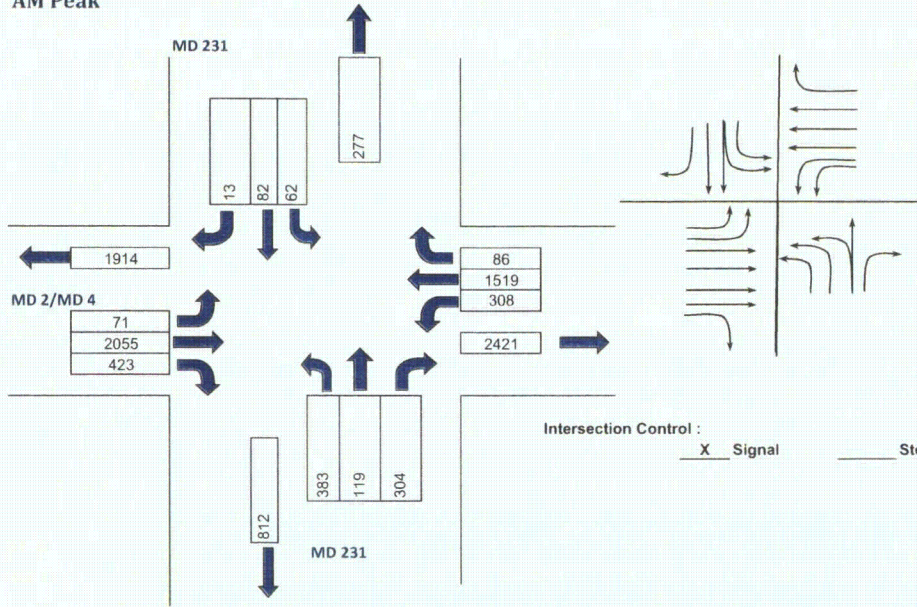
Intersection Control :  Signal     Stop     Ways

**MD 2/MD 4 Diverge  
(Concept 1)  
Construction, 2016, With Mitigation  
KLD Engineering, P.C.**

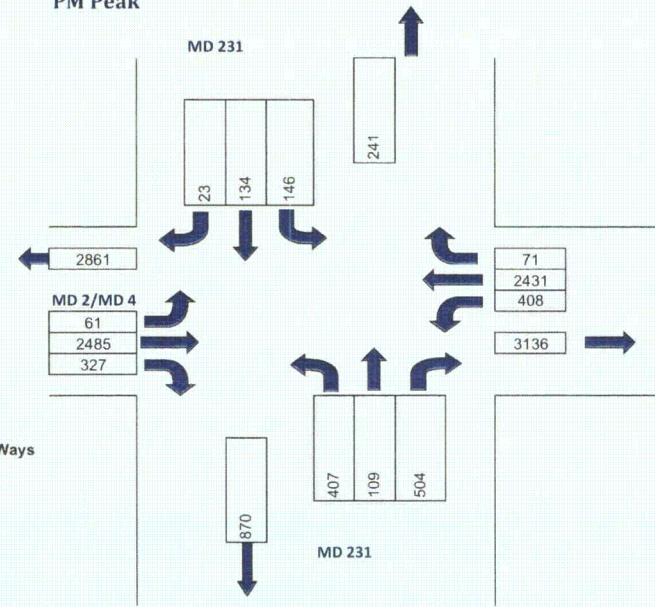
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	1.00	79	1,050	NBT	1,569	0.55	863	176	1.00	176	1,039	
SBT	1,501	0.40	600	0	1.00	0	600	SBT	2,593	0.40	1037	0	1.00	0	1,037	
WBL	829	0.60	497	0	1.00	0	497	WBL	908	0.60	545	0	1.00	0	545	
Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume				Total	Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume			
								LOS E					LOS E			
								1,547					1,583			

AM Peak



PM Peak



Intersection Control :  
 Signal     Stop     Ways



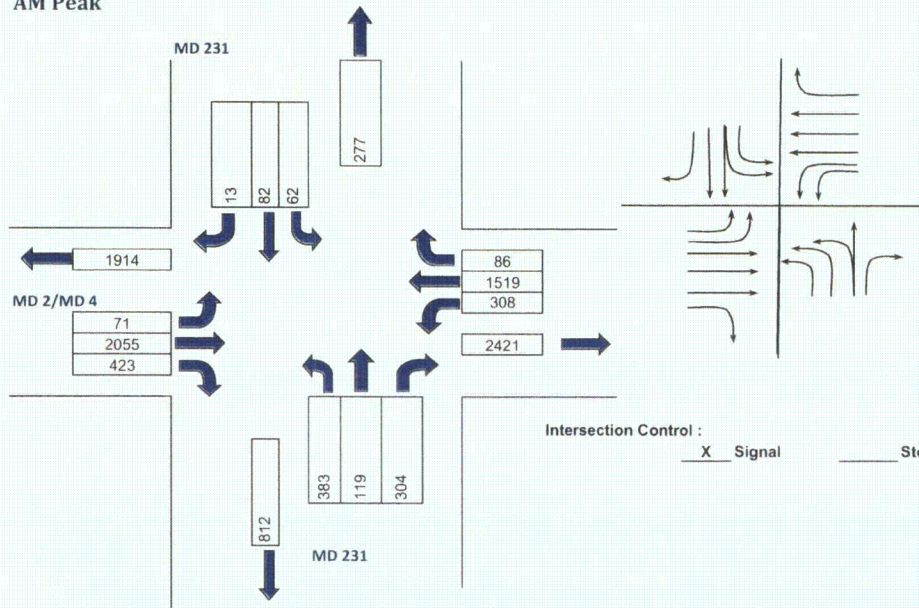
MD 231 & MD 2/MD 4  
 (Option 1)  
 Construction, 2016, With Mitigation  
 KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
DbI LT	0.6	1450	E	800	4
		1600	F	1000	5

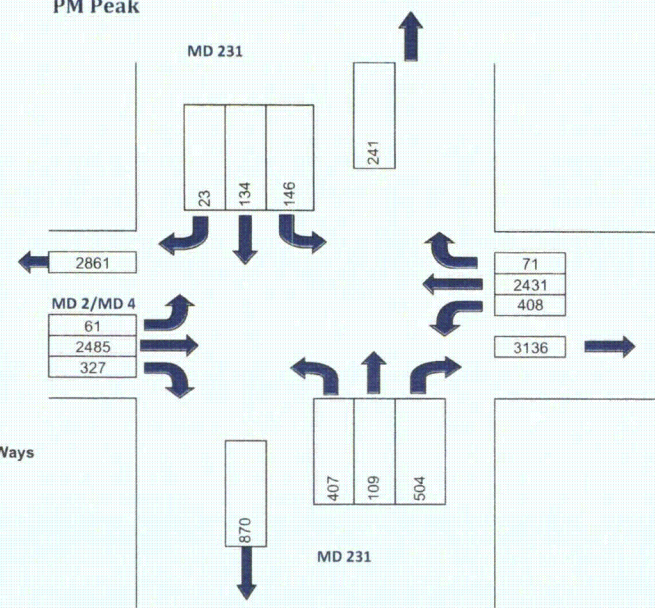
Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
NBT	1,519	0.40	607	71	0.60	43	650	NBT	2,431	0.40	972	61	0.60	37	1,009
SBT	2,055	0.30	617	308	0.60	185	801	SBT	2,485	0.30	746	408	0.60	245	991
EBTL	502	0.45	226	0	1.00	0	226	EBTL	516	0.45	232	0	1.00	0	232
WBTL	144	0.45	65	0	1.00	0	65	WBTL	280	0.45	126	0	1.00	0	126

Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS B	1,092	Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded	Critical Lane Volume Total LOS D	1,367
---	--	-------	---	--	-------

AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

MD 231 & MD 2/MD 4  
(Option 2)  
Construction, 2016, With Mitigation  
KLD Engineering, P.C.

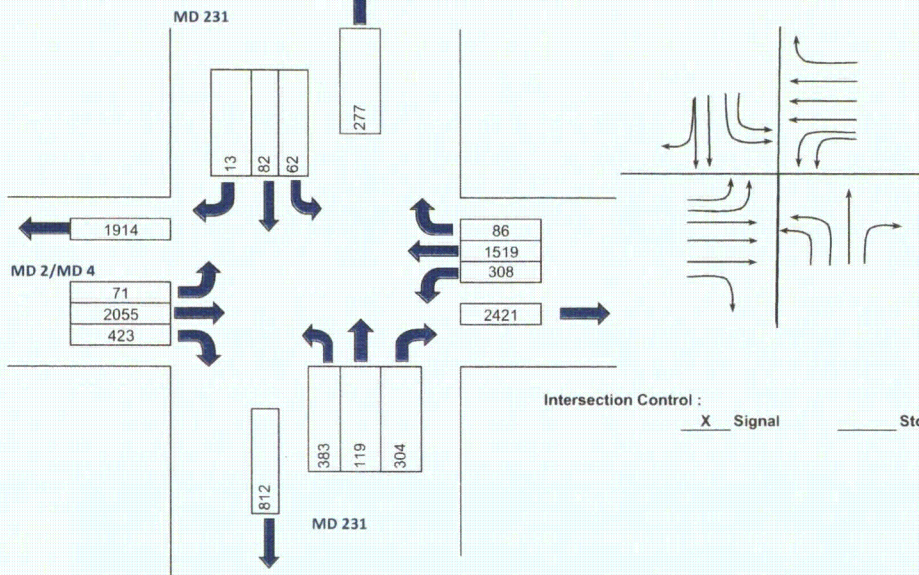
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	0.60	43	650	NBT	2,431	0.40	972	61	0.60	37	1,009
SBT	2,055	0.40	822	308	0.60	185	1,007	SBT	2,485	0.40	994	408	0.60	245	1,239
EBTL	502	0.45	226	0	1.00	0	226	EBTL	516	0.45	232	0	1.00	0	232
WBTL	144	0.45	65	0	1.00	0	65	WBTL	280	0.45	126	0	1.00	0	126

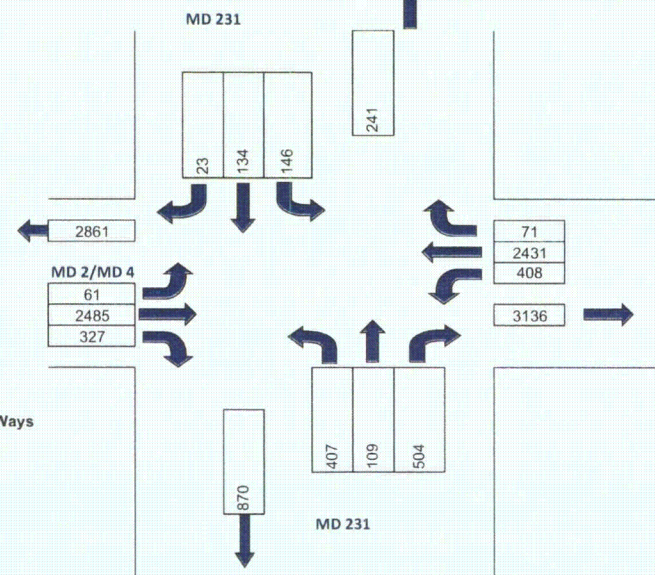
Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS C 1,297

Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS E 1,597

AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

MD 231 & MD 2/MD 4  
(Option 3)  
Construction, 2016, With Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbl LT	0.6	1450	E	800	4
		1600	F	1000	5

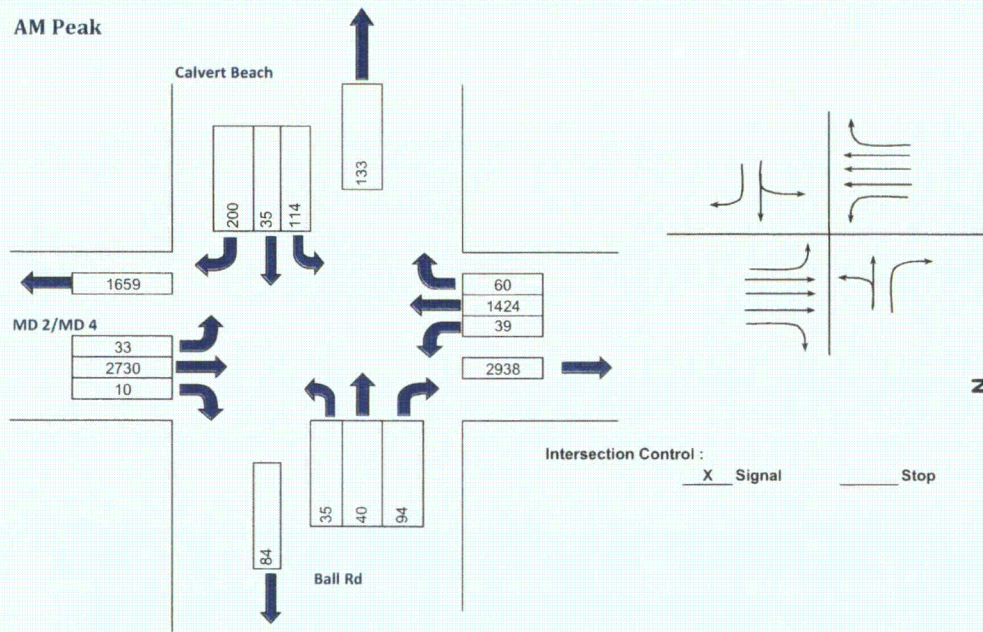
Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)	Movement	Volume (1)	LUF (2)	Lane Volume (1) X (2) = (3)	Opposing Lefts (4)	LUF (5)	Opposing CLV (4)X(5) = (6)	CLV (5)+(6)=(7)
NBT	1,519	0.40	607	71	0.60	43	650	NBT	2,431	0.40	972	61	0.60	37	1,009
SBT	2,055	0.40	822	308	0.60	185	1,007	SBT	2,485	0.40	994	408	0.60	245	1,239
EBL	383	0.60	230	0	1.00	0	230	EBL	407	0.60	244	0	1.00	0	244
WBTR	94	0.55	52	0	1.00	0	52	WBTR	157	0.55	87	0	1.00	0	87
WBL	62	0.60	37	0	1.00	0	37	WBL	146	0.60	88	0	1.00	0	88

Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS C 1,288

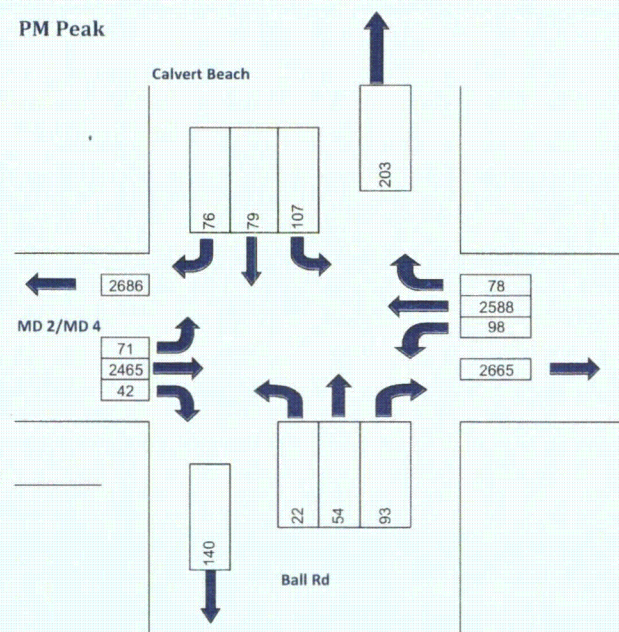
Remarks: Split Phase, EB & WB  
Right turns with a dedicated lane >150 ft are excluded  
Critical Lane Volume  
Total LOS E 1,571



AM Peak



PM Peak



Intersection Control :  Signal  Stop  Ways

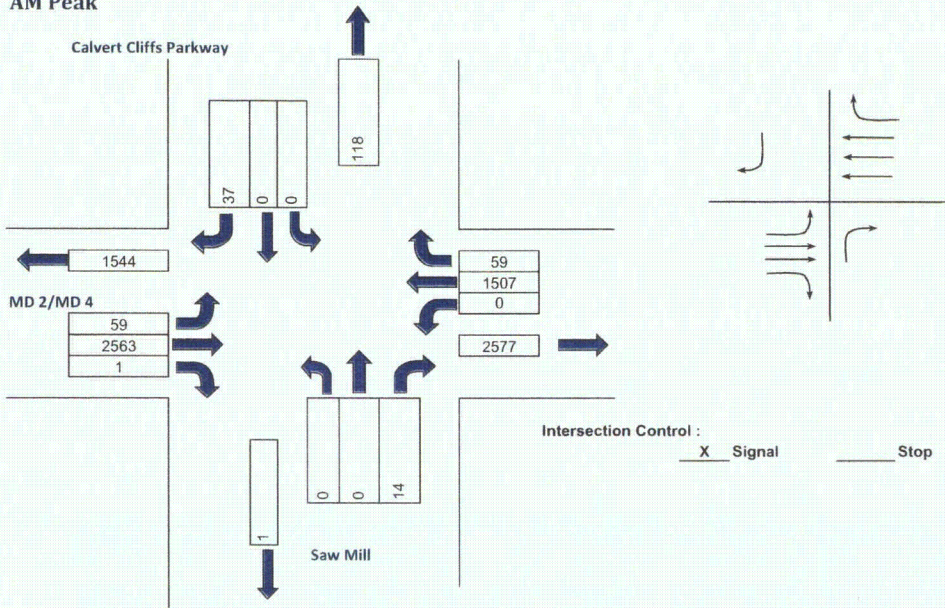
Calvert Beach/Ball Road & MD 2/MD 4 Construction, 2016, With Mitigation

KLD Engineering, P.C.

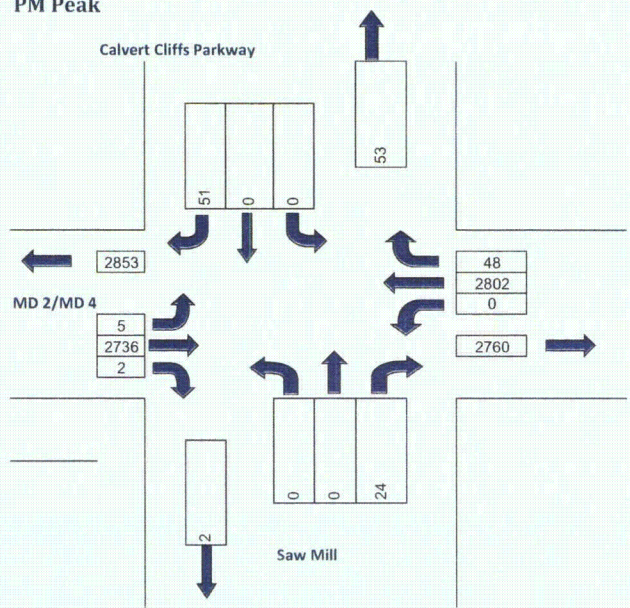
Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Db'l LT	0.6	1450	E	800	4
		1600	F	1000	5

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)	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	0.40	570	33	1.00	33	603	NBT	2,588	0.40	1035	71	1.00	71	1,106
SBT	2,730	0.40	1,092	39	1.00	39	1,131	SBT	2,465	0.40	986	98	1.00	98	1,084
EBTL	75	1.00	75	0	1.00	0	75	EBTL	76	1.00	76	0	1.00	0	76
WBTL	149	1.00	149	0	1.00	0	149	WBTL	186	1.00	186	0	1.00	0	186
Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total 1,355 LOS D				Remarks: Split Phase, EB & WB Right turns with a dedicated lane >150 ft are excluded				Critical Lane Volume Total 1,368 LOS D			

**AM Peak**



**PM Peak**



Intersection Control :  Signal  Stop  Ways



Calvert Cliffs Parkway &  
MD 2/MD 4  
Construction, 2016, With Mitigation  
KLD Engineering, P.C.

Lanes	LUF	CLV	LOS	Opposing Volume	PCE
1	1	0	A		
2	0.55	1000	B	0	1.1
3	0.4	1150	C	200	2
4	0.3	1300	D	600	3
Dbt LT	0.6	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)	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	0.40	603	59	1	59	662	NBT	2,802	0.4	1121	5	1	5	1,126
WBR	0	1.00	0	0	1.00	0	0	WBR	46	1.00	46	0	1.00	0	46
WBL	0	1.00	0	0	1.00	0	0	WBL	0	1.00	0	0	1.00	0	0

Remarks: WBR = 37 - 59 < 0 Critical Lane Volume Total LOS A 662  
Right turns with a dedicated lane >150 ft are excluded

Remarks: WBR = 51 - 5 Critical Lane Volume Total LOS C 1,172  
Right turns with a dedicated lane >150 ft are excluded

### 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)
<b>Background, 2016, No Mitigation</b>											
SBL	2016	AM	E	3	150	79	1.00	79	3.3	4.6	115
SBL	2016	PM	D	3	135	176	1.00	176	6.6	9.2	231
800 feet of storage available (approximately)											
WBL	2016	AM	E	3	150	464	1.00	464	19.3	27.1	677
WBL	2016	PM	D	3	135	695	1.00	695	26.1	36.5	912
450 feet of storage available (approximately)											
NBT	2016	AM	E	3	150	1766	0.55	971	40.5	56.7	1416
NBT	2016	PM	D	3	135	825	0.55	454	17.0	23.8	596
630 feet of storage available (approximately) before NBT blocks NBR bypass lane											
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)
<b>Background, 2016, No Mitigation</b>											
NBL	2016	AM	A	5	100	308	0.60	185	5.1	7.2	180
NBL	2016	PM	C	5	120	233	0.60	140	4.7	6.5	163
400 feet of storage available (approximately)											
SBL	2016	AM	A	5	100	71	0.60	43	1.2	1.7	42
SBL	2016	PM	C	5	120	61	0.60	37	1.2	1.7	43
400 feet of storage available (approximately)											
EBL	2016	AM	A	5	100	383	0.60	230	6.4	8.9	223
EBL	2016	PM	C	5	120	407	0.60	244	8.1	11.4	285
385 feet of storage available (approximately)											
WBL	2016	AM	A	5	100	62	0.60	37	1.0	1.4	36
WBL	2016	PM	C	5	120	146	0.60	88	2.9	4.1	102
360 feet of storage available (approximately)											
Queue length exceeds available storage											

### 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)
<b>Background, 2016, No Mitigation</b>											
NBL	2016	AM	B	5	100	39	1.00	39	1.1	1.5	38
NBL	2016	PM	C	5	120	98	1.00	98	3.3	4.6	114
500 feet of storage available (approximately)											
SBL	2016	AM	B	5	100	33	1.00	33	0.9	1.3	32
SBL	2016	PM	C	5	120	71	1.00	71	2.4	3.3	83
575 feet of storage available (approximately)											
EBTL	2016	AM	B	5	100	75	1.00	75	2.1	2.9	73
EBTL	2016	PM	C	5	120	76	1.00	76	2.5	3.5	89
300 feet of storage available (approximately) before EBTL blocks the EBR bypass lane											
WBTL	2016	AM	B	5	100	149	1.00	149	4.1	5.8	145
WBTL	2016	PM	C	5	120	186	1.00	186	6.2	8.7	217
350 feet of storage available (approximately) before WBTL blocks the WBR bypass lane											
NBT	2016	AM	B	5	100	1424	0.55	783	21.8	30.5	761
NBT	2016	PM	C	5	120	1130	0.55	622	20.7	29.0	725
SBT	2016	AM	B	5	100	1271	0.55	699	19.4	27.2	680
SBT	2016	PM	B	5	120	1614	0.55	888	29.6	41.4	1036
	Queue length exceeds available storage										



### 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)
<b>Background, 2016, No Mitigation</b>											
NBL	2016	AM	A	3	100	17	1.00	17	0.5	0.7	17
NBL	2016	PM	C	3	120	86	1.00	86	2.9	4.0	100
550 feet of storage available (approximately)											
EBTL	2016	AM	A	3	100	137	1.00	137	3.8	5.3	133
EBTL	2016	PM	C	3	120	82	1.00	82	2.7	3.8	96
80 feet of storage available (approximately)											
SBT	2016	AM	A	3	100	1141	0.55	628	17.4	24.4	610
SBT	2016	PM	C	3	120	1875	0.55	1031	34.4	48.1	1203
500 feet of storage available (approximately) before SBT blocks SBR bypass lane											
	Queue length exceeds available storage										

**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)
<b>Background, 2016, No Mitigation</b>											
SBL	2016	AM	A	3	100	7	1.00	7	0.2	0.3	7
SBL	2016	PM	B	3	100	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 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)
<b>Background, 2016, No Mitigation</b>											
SBL	2016	AM	A	3	100	96	1.00	96	2.7	3.7	93
SBL	2016	PM	C	3	120	410	1.00	410	13.7	19.1	478
550 feet of storage available (approximately)											
WBL	2016	AM	A	3	100	171	1.00	171	4.8	6.7	166
WBL	2016	PM	C	3	120	149	1.00	149	5.0	7.0	174
300 feet of storage available (approximately)											
	Queue length exceeds available storage										

### Maryland SHA Queuing Analysis

Location: MD 2 and MD 4

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)
<b>No Build, 2016, With Mitigation</b>											
<b>Concept 2</b>											
SBL	2016	AM	C	3	120	79	1.00	79	2.6	3.7	92
SBL	2016	PM	C	3	120	176	1.00	176	5.9	8.2	205
800 feet of storage available (approximately)											
WBL	2016	AM	C	3	120	464	0.45	209	7.0	9.7	244
WBL	2016	PM	C	3	120	695	0.45	313	10.4	14.6	365
450 feet of storage available (approximately)											
NBT	2016	AM	C	3	120	1766	0.55	971	32.4	45.3	1133
NBT	2016	PM	C	3	120	825	0.55	454	15.1	21.2	529
630 feet of storage available (approximately) before NBT blocks NBR bypass lane											
SBT	2016	AM	C	3	120	757	0.40	303	10.1	14.1	353
SBT	2016	PM	C	3	120	2159	0.40	864	28.8	40.3	1008
Queue length exceeds available storage											

**Maryland SHA Queuing Analysis**

Location: MD 2 and MD 4

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)
<b>No Build, 2016, With Mitigation</b>											
<b>Concept 1</b>											
SBL	2016	AM	D	3	135	79	1.00	79	3.0	4.1	104
SBL	2016	PM	C	3	120	176	1.00	176	5.9	8.2	205
800 feet of storage available (approximately)											
WBL	2016	AM	D	3	135	464	0.60	278	10.4	14.6	365
WBL	2016	PM	C	3	120	695	0.60	417	13.9	19.5	487
450 feet of storage available (approximately)											
NBT	2016	AM	D	3	135	1766	0.55	971	36.4	51.0	1275
NBT	2016	PM	C	3	120	825	0.55	454	15.1	21.2	529
630 feet of storage available (approximately) before NBT blocks NBR bypass lane											
SBT	2016	AM	D	3	135	757	0.40	303	11.4	15.9	397
SBT	2016	PM	C	3	120	2159	0.40	864	28.8	40.3	1008
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)
<b>No Build, 2016, With Mitigation</b>											
<b>Option 2</b>											
NBL	2016	AM	A	5	100	308	0.60	185	5.1	7.2	180
NBL	2016	PM	C	5	120	233	0.60	140	4.7	6.5	163
400 feet of storage available (approximately)											
SBL	2016	AM	A	5	100	71	0.60	43	1.2	1.7	41
SBL	2016	PM	C	5	120	61	0.60	37	1.2	1.7	43
400 feet of storage available (approximately)											
EBTL	2016	AM	A	5	100	502	0.45	226	6.3	8.8	220
EBTL	2016	PM	C	5	120	516	0.45	232	7.7	10.8	271
385 feet of storage available (approximately)											
WBTL	2016	AM	A	5	100	144	0.45	65	1.8	2.5	63
WBTL	2016	PM	C	5	120	280	0.45	126	4.2	5.9	147
360 feet of storage available (approximately)											
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)
<b>No Build, 2016, With Mitigation</b>											
<b>Option 3</b>											
NBL	2016	AM	A	5	100	308	0.60	185	5.1	7.2	180
NBL	2016	PM	C	5	120	233	0.60	140	4.7	6.5	163
400 feet of storage available (approximately)											
SBL	2016	AM	A	5	100	71	0.60	43	1.2	1.7	41
SBL	2016	PM	C	5	120	61	0.60	37	1.2	1.7	43
400 feet of storage available (approximately)											
EBL	2016	AM	A	5	100	383	0.60	230	6.4	8.9	223
EBL	2016	PM	C	5	120	407	0.60	244	8.1	11.4	285
385 feet of storage available (approximately)											
WBL	2016	AM	A	5	100	62	0.60	37	1.0	1.4	36
WBL	2016	PM	C	5	120	146	0.60	88	2.9	4.1	102
360 feet of storage available (approximately)											
WBTR	2016	AM	A	5	100	95	0.55	52	1.5	2.0	51
WBTR	2016	PM	C	5	120	157	0.55	86	2.9	4.0	101
	Queue length exceeds available storage										

**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)
<b>No Build, 2016, With Mitigation</b>											
NBL	2016	AM	A	5	100	39	1.00	39	1.1	1.5	38
NBL	2016	PM	B	5	100	98	1.00	98	2.7	3.8	95
500 feet of storage available (approximately)											
SBL	2016	AM	A	5	100	33	1.00	33	0.9	1.3	32
SBL	2016	PM	B	5	100	71	1.00	71	2.0	2.8	69
575 feet of storage available (approximately)											
EBTL	2016	AM	A	5	100	75	1.00	75	2.1	2.9	73
EBTL	2016	PM	B	5	100	76	1.00	76	2.1	3.0	74
300 feet of storage available (approximately) before EBTL blocks the EBR bypass lane											
WBTL	2016	AM	A	5	100	149	1.00	149	4.1	5.8	145
WBTL	2016	PM	B	5	100	186	1.00	186	5.2	7.2	181
350 feet of storage available (approximately) before WBTL blocks the WBR bypass lane											
NBT	2016	AM	A	5	100	1424	0.4	570	15.8	22.2	554
NBT	2016	PM	B	5	100	1130	0.4	452	12.6	17.6	439
SBT	2016	AM	A	5	100	1271	0.4	508	14.1	19.8	494
SBT	2016	PM	A	5	100	1614	0.4	646	17.9	25.1	628
	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)
<b>No Build, 2016, With Mitigation</b>											
SBL	2016	AM	A	3	100	59	1.00	59	1.6	2.3	57
SBL	2016	PM	A	3	100	5	1.00	5	0.1	0.2	5
600 feet of storage available (approximately)											
NBT	2016	AM	0	3	100	1507	0.55	829	23.0	32.2	806
NBT	2016	PM	0	3	100	1344	0.55	739	20.5	28.7	719
2950 feet available prior to next intersection (approximately)											
	Queue length exceeds available storage										

**Maryland SHA Queuing Analysis**

Location: MD 2 and MD 4

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)
<b>Construction, 2016, With Mitigation</b>											
<b>Concept 2</b>											
SBL	2016	AM	D	3	135	79	1.00	79	3.0	4.1	103
SBL	2016	PM	D	3	135	176	1.00	176	6.6	9.2	231
800 feet of storage available (approximately)											
WBL	2016	AM	D	3	135	829	0.45	373	14.0	19.6	489
WBL	2016	PM	D	3	135	908	0.45	408	15.3	21.4	536
450 feet of storage available (approximately)											
NBT	2016	AM	D	3	135	1766	0.55	971	36.4	51.0	1275
NBT	2016	PM	D	3	135	1569	0.55	863	32.4	45.3	1133
630 feet of storage available (approximately) before NBT blocks NBR bypass lane											
SBT	2016	AM	D	3	135	1501	0.40	600	22.5	31.5	788
SBT	2016	PM	D	3	135	2593	0.40	1037	38.9	54.4	1361
Queue length exceeds available storage											

**Maryland SHA Queuing Analysis**

Location: MD 2 and MD 4

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)
<b>Construction, 2016, With Mitigation</b>											
<b>Concept 1</b>											
SBL	2016	AM	E	3	150	79	1.00	79	3.3	4.6	115
SBL	2016	PM	E	3	150	176	1.00	176	7.3	10.2	256
800 feet of storage available (approximately)											
WBL	2016	AM	E	3	150	829	0.60	497	20.7	29.0	725
WBL	2016	PM	E	3	150	908	0.60	545	22.7	31.8	794
450 feet of storage available (approximately)											
NBT	2016	AM	E	3	150	1766	0.55	971	40.5	56.7	1416
NBT	2016	PM	E	3	150	1569	0.55	863	36.0	50.3	1259
630 feet of storage available (approximately) before NBT blocks NBR bypass lane											
SBT	2016	AM	E	3	150	1501	0.40	600	25.0	35.0	875
SBT	2016	PM	E	3	150	2593	0.40	1037	43.2	60.5	1512
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)
<b>Construction, 2016, With Mitigation</b>											
<b>Option 1</b>											
NBL	2016	AM	B	5	100	308	0.60	185	5.1	7.2	180
NBL	2016	PM	D	5	135	408	0.60	245	9.2	12.9	321
400 feet of storage available (approximately)											
SBL	2016	AM	B	5	100	71	0.60	43	1.2	1.7	42
SBL	2016	PM	D	5	135	61	0.60	37	1.4	1.9	48
400 feet of storage available (approximately)											
EBTL	2016	AM	B	5	100	502	0.45	226	6.3	8.8	220
EBTL	2016	PM	D	5	135	516	0.45	232	8.7	12.2	305
385 feet of storage available (approximately)											
WBTL	2016	AM	B	5	100	144	0.45	65	1.8	2.5	63
WBTL	2016	PM	D	5	135	280	0.45	126	4.7	6.6	166
360 feet of storage available (approximately)											
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)
<b>Construction, 2016, With Mitigation</b>											
<b>Option 2</b>											
NBL	2016	AM	C	5	120	308	0.60	185	6.2	8.6	215
NBL	2016	PM	E	5	150	408	0.60	245	10.2	14.3	357
400 feet of storage available (approximately)											
SBL	2016	AM	C	5	120	71	0.60	43	1.4	2.0	50
SBL	2016	PM	E	5	150	61	0.60	37	1.5	2.1	53
400 feet of storage available (approximately)											
EBTL	2016	AM	C	5	120	502	0.45	226	7.5	10.5	264
EBTL	2016	PM	E	5	150	516	0.45	232	9.7	13.5	338
385 feet of storage available (approximately)											
WBTL	2016	AM	C	5	120	144	0.45	65	2.2	3.0	75
WBTL	2016	PM	E	5	150	280	0.45	126	5.3	7.4	184
360 feet of storage available (approximately)											
	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)
<b>Construction, 2016, With Mitigation</b>											
<b>Option 3</b>											
NBL	2016	AM	C	5	120	308	0.60	185	6.2	8.6	215
NBL	2016	PM	E	5	150	408	0.60	245	10.2	14.3	357
400 feet of storage available (approximately)											
SBL	2016	AM	C	5	120	71	0.60	43	1.4	2.0	50
SBL	2016	PM	E	5	150	61	0.60	37	1.5	2.1	53
400 feet of storage available (approximately)											
EBL	2016	AM	C	5	120	383	0.60	230	7.7	10.7	268
EBL	2016	PM	E	5	150	407	0.60	244	10.2	14.2	356
385 feet of storage available (approximately)											
WBL	2016	AM	C	5	120	62	0.60	37	1.2	1.7	43
WBL	2016	PM	E	5	150	146	0.60	88	3.6	5.1	128
360 feet of storage available (approximately)											
WBTR	2016	AM	C	5	120	94	0.55	52	1.7	2.4	60
WBTR	2016	PM	E	5	150	157	0.55	87	3.6	5.0	126
	Queue length exceeds available storage										

**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)
<b>Construction, 2016, With Mitigation</b>											
NBL	2016	AM	D	5	135	39	1.00	39	1.5	2.0	51
NBL	2016	PM	D	5	135	98	1.00	98	3.7	5.1	129
500 feet of storage available (approximately)											
SBL	2016	AM	D	5	135	33	1.00	33	1.2	1.7	43
SBL	2016	PM	D	5	135	71	1.00	71	2.7	3.7	93
575 feet of storage available (approximately)											
EBTL	2016	AM	D	5	135	75	1.00	75	2.8	3.9	98
EBTL	2016	PM	D	5	135	76	1.00	76	2.9	4.0	100
300 feet of storage available (approximately) before EBTL blocks the EBR bypass lane											
WBTL	2016	AM	D	5	135	149	1.00	149	5.6	7.8	196
WBTL	2016	PM	D	5	135	186	1.00	186	7.0	9.8	244
350 feet of storage available (approximately) before WBTL blocks the WBR bypass lane											
NBT	2016	AM	D	5	135	1424	0.4	570	21.4	29.9	747
NBT	2016	PM	D	5	135	2588	0.4	1035	38.8	54.4	1359
SBT	2016	AM	D	5	135	2730	0.4	1092	40.9	57.3	1433
SBT	2016	PM	D	5	135	2465	0.4	986	37.0	51.8	1294
	Queue length exceeds available storage										

