Appendix J
Historical Crash Data and Supporting Information

Historical Crash Summaries

HISTORICAL CRASH SUMMARIES

I-270 & East Spur– General Crash Characteristics

Crash Type		Number of Crashes along I-270				Total Crashes	% of Total Crashes
		NB GPL	SB GPL	Ramps	Crossing Roadways and Ramp Terminals		
Year	2016	231	210	138	230	809	31%
	2017	278	195	117	275	865	33%
	2018	314	225	161	272	972	37%
Collision Type	Head On	1	0	0	5	6	0%
	Left Turn	0	0	0	105	105	4%
	Rear End	447	344	101	296	1188	45%
	Sideswipe	107	105	30	88	330	12%
	Angle	0	0	3	135	138	5%
	Single Vehicle	268	181	282	148	879	33%
Crash Severity	Fatal	1	2	1	1	5	0%
	Ambulatory Injury	17	7	4	14	42	2%
	Visible Injury	65	72	30	130	297	11%
	Non-visible Injury	166	155	70	151	542	20%
	Property Damage Only	574	394	311	481	1760	67%
Light Condition	Daylight	469	414	275	524	1682	64%
	Dark / Dawn	30	39	17	32	118	4%
	Dark Light On	282	146	100	192	720	27%
	Dark No Lights	22	15	14	16	67	3%
	Other / Unknown	20	16	10	13	59	2%
Weather Condition	Clear	641	478	219	565	1903	72%
	Foggy	1	2	1	6	10	0%
	Raining	126	97	169	132	524	20%
	Snow / Sleet	10	17	9	11	47	2%
	Severe Winds	0	0	0	1	1	0%
	Other / Unknown	45	36	18	62	161	6%
Time of Day	AM Peak Hours (6 am - 10 am)	271	191	134	236	832	31%
	Mid-day Hours (10 am - 3 pm)	116	103	98	36	353	13%
	PM Peak Hours (3 pm - 7 pm)	79	68	15	60	222	8%
	Off Peak Hours (7 pm - 6 am)	61	64	34	165	324	12%
Total Crashes by Facility		823	630	416	777	2646	100%

I-270 & East Spur– Crashes by Time of Day

Time of Day (Hour)	I-270				
	NB GPL	SB GPL	Ramps	Crossroads and Ramp Terminals	Total
0	18	10	13	5	46
1	15	7	5	7	34
2	24	6	4	13	47
3	17	6	5	6	34
4	18	13	5	9	45
5	24	14	9	8	55
6	25	54	17	28	124
7	23	80	23	37	163
8	13	75	26	59	173
9	35	61	24	62	182
10	25	54	33	48	160
11	19	31	26	44	120
12	15	25	20	39	99
13	27	12	22	46	107
14	19	21	26	45	111
15	49	26	18	36	129
16	97	18	19	45	179
17	119	29	32	64	244
18	114	12	18	66	210
19	36	16	22	32	106
20	31	16	11	15	73
21	19	9	15	29	72
22	25	23	15	22	85
23	16	12	8	12	48
Total					2646

I-270 West Spur– General Crash Characteristics

Crash Type		Number of Crashes along I-270Y				Total Crashes	% of Total Crashes
		NB GPL	SB GPL	Ramps	Crossing Roadways and Ramp Terminals		
Year	2016	17	29	4	17	67	30%
	2017	32	23	9	21	85	38%
	2018	26	19	7	21	73	32%
Collision Type	Head On	0	0	0	0	0	0%
	Left Turn	0	0	0	9	9	4%
	Rear End	40	47	5	24	116	52%
	Sideswipe	11	10	1	7	29	13%
	Angle	0	0	0	12	12	5%
	Single Vehicle	24	14	14	7	59	26%
Crash Severity	Fatal	0	0	0	0	0	0%
	Ambulatory Injury	1	1	0	1	3	1%
	Visible Injury	5	6	1	13	25	11%
	Non-visible Injury	14	15	4	6	39	17%
	Property Damage Only	55	49	15	39	158	70%
Light Condition	Daylight	41	50	13	45	149	66%
	Dark / Dawn	5	2	0	1	8	4%
	Dark Light On	25	17	6	12	60	27%
	Dark No Lights	3	0	0	1	4	2%
	Other / Unknown	1	2	1	0	4	2%
Weather Condition	Clear	46	58	11	46	161	72%
	Foggy	0	0	0	0	0	0%
	Raining	21	10	8	7	46	20%
	Snow / Sleet	1	2	0	0	3	1%
	Severe Winds	0	0	0	0	0	0%
	Other / Unknown	7	1	1	0	9	4%
Time of Day	AM Peak Hours (6 am - 10 am)	22	27	8	19	76	34%
	Mid-day Hours (10 am - 3 pm)	19	12	4	1	36	16%
	PM Peak Hours (3 pm - 7 pm)	4	8	2	3	17	8%
	Off Peak Hours (7 pm - 6 am)	3	6	1	11	21	9%
Total Crashes by Facility		75	71	20	59	225	100%

I-270 West Spur– Crashes by Time of Day

Time of Day (Hour)	I-270Y				
	NB GPL	SB GPL	Ramps	Crossroads and Ramp Terminals	Total
0	3	0	1	0	4
1	2	0	1	0	3
2	2	0	0	0	2
3	5	0	0	0	5
4	3	1	0	0	4
5	0	1	1	0	2
6	2	3	0	0	5
7	3	6	0	3	12
8	2	4	0	3	9
9	2	6	0	2	10
10	5	4	1	3	13
11	1	3	0	3	7
12	0	4	2	4	10
13	2	4	3	0	9
14	3	8	2	4	17
15	6	5	3	9	23
16	7	4	1	4	16
17	12	5	1	8	26
18	5	5	1	8	19
19	0	4	1	1	6
20	4	2	2	4	12
21	0	1	0	1	2
22	3	1	0	2	6
23	3	0	0	0	3
Total	75	71	20	59	225

I-495 in Maryland – General Crash Characteristics

Crash Type		Number of Crashes along I-495				Total Crashes	% of Total Crashes
		NB GPL	SB GPL	Ramps	Crossing Roadways and Ramp Terminals		
Year	2016	116	129	44	79	368	31%
	2017	112	161	46	80	399	33%
	2018	154	177	31	71	433	36%
Collision Type	Head On	0	0	0	1	1	0%
	Left Turn	0	0	0	38	38	3%
	Rear End	217	276	41	103	637	53%
	Sideswipe	65	80	15	24	184	15%
	Angle	0	0	0	37	37	3%
	Single Vehicle	100	111	65	27	303	25%
Crash Severity	Fatal	2	0	0	2	4	0%
	Ambulatory Injury	7	3	4	8	22	2%
	Visible Injury	26	27	10	34	97	8%
	Non-visible Injury	81	97	21	48	247	21%
	Property Damage Only	266	340	86	138	830	69%
Light Condition	Daylight	206	285	65	159	715	60%
	Dark / Dawn	20	24	8	13	65	5%
	Dark Light On	125	132	44	44	345	29%
	Dark No Lights	21	15	4	9	49	4%
	Other / Unknown	10	11	0	5	26	2%
Weather Condition	Clear	292	343	91	177	903	75%
	Foggy	1	2	0	0	3	0%
	Raining	61	80	22	27	190	16%
	Snow / Sleet	4	7	2	2	15	1%
	Severe Winds	1	1	0	0	2	0%
	Other / Unknown	23	34	6	24	87	7%
Time of Day	AM Peak Hours (6 am - 10 am)	120	173	38	64	395	33%
	Mid-day Hours (10 am - 3 pm)	49	74	13	7	143	12%
	PM Peak Hours (3 pm - 7 pm)	33	39	6	7	85	7%
	Off Peak Hours (7 pm - 6 am)	46	41	13	47	147	12%
Total Crashes by Facility		382	467	121	230	1200	100%

I-495 in Maryland – Crashes by Time of Day

Time of Day (Hour)	I-495				
	NB GPL	SB GPL	Ramps	Crossroads and Ramp Terminals	Total
0	9	9	4	4	26
1	12	8	3	2	25
2	6	7	2	0	15
3	6	9	4	0	19
4	4	10	5	3	22
5	9	13	3	2	27
6	17	23	8	7	55
7	20	19	12	8	59
8	11	29	8	13	61
9	8	32	3	15	58
10	10	22	6	18	56
11	14	14	6	16	50
12	11	12	4	11	38
13	15	23	3	13	54
14	18	22	6	15	61
15	27	35	6	12	80
16	35	40	8	17	100
17	36	41	6	17	100
18	28	48	6	21	103
19	25	20	3	14	62
20	19	5	3	10	37
21	16	11	6	5	38
22	12	8	4	3	27
23	14	7	2	4	27
Total	382	467	121	230	1200

I-495 in Virginia – General Crash Characteristics

Crash Type		Number of Crashes along I-495 VA				Total Crashes	% of Total Crashes
		NB GPL	SB GPL	Ramps	Crossing Roadways and Ramp Terminals		
Year	2016	99	38	13	49	199	31%
	2017	101	52	8	48	209	33%
	2018	105	45	25	49	224	35%
Collision Type	Head On	0	1	0	6	7	1%
	Left Turn	0	0	0	0	0	0%
	Rear End	201	69	18	60	348	55%
	Sideswipe	65	30	4	6	105	17%
	Angle	13	12	0	48	73	12%
	Single Vehicle	26	23	27	26	102	16%
Crash Severity	Fatal	0	0	0	0	0	0%
	Ambulatory Injury	6	3	3	1	13	2%
	Visible Injury	73	18	10	28	129	20%
	Non-visible Injury	6	6	0	16	28	4%
	Property Damage Only	220	108	33	101	462	73%
Light Condition	Daylight	237	92	26	107	462	73%
	Dark / Dawn	9	8	3	17	37	6%
	Dark Light On	33	22	8	11	74	12%
	Dark No Lights	26	13	9	11	59	9%
	Other / Unknown	0	0	0	0	0	0%
Weather Condition	Clear	270	117	28	119	534	84%
	Foggy	4	1	2	4	11	2%
	Raining	29	16	16	19	80	13%
	Snow / Sleet	2	1	0	4	7	1%
	Severe Winds	0	0	0	0	0	0%
	Other / Unknown	0	0	0	0	0	0%
Time of Day	AM Peak Hours (6 am - 10 am)	0	0	0	0	0	0%
	Mid-day Hours (10 am - 3 pm)	0	0	0	0	0	0%
	PM Peak Hours (3 pm - 7 pm)	0	0	0	0	0	0%
	Off Peak Hours (7 pm - 6 am)	0	0	0	0	0	0%
Total Crashes by Facility		305	135	46	146	632	100%

I-495 in Virginia – Crashes by Time of Day

Time of Day (Hour)	I-495 VA				
	NB GPL	SB GPL	Ramps	Crossroads and Ramp Terminals	Total
0	2	2	1	0	5
1	2	3	1	1	7
2	1	1	1	0	3
3	4	1	0	1	6
4	2	2	1	2	7
5	6	4	1	2	13
6	7	4	3	7	21
7	15	1	3	10	29
8	28	9	0	8	45
9	28	13	1	4	46
10	9	4	3	2	18
11	5	5	3	5	18
12	8	4	1	4	17
13	6	8	3	13	30
14	35	7	1	11	54
15	41	11	3	18	73
16	34	16	1	13	64
17	24	9	3	18	54
18	16	15	2	9	42
19	10	3	2	9	24
20	8	6	0	4	18
21	7	1	2	2	12
22	2	3	1	2	8
23	4	1	1	0	6
Total	304	133	38	145	620

Phase I South Study Area – General Crash Characteristics

Crash Type		Number of Crashes within Phase 1 South								
		Freeway Components								
		NB GPL	SB GPL	Ramps	Freeway Total	Freeway Total	Crossing Roadways and Ramp Terminals	Crossing Roadways and Ramp Terminals	Total Crashes	Total Crashes
Year	2016	463	406	199	1068	31%	375	31%	1443	31%
	2017	523	431	180	1134	32%	424	35%	1558	33%
	2018	599	466	224	1289	37%	413	34%	1702	36%
Collision Type	Head On	1	1	0	2	0%	12	1%	14	0%
	Left Turn	0	0	0	0	0%	152	13%	152	3%
	Rear End	905	736	165	1806	52%	483	40%	2289	49%
	Sideswipe	248	225	50	523	15%	125	10%	648	14%
	Angle	13	12	3	28	1%	232	19%	260	6%
	Single Vehicle	418	329	388	1135	33%	208	17%	1343	29%
Crash Severity	Fatal	3	2	1	6	0%	3	0%	9	0%
	Ambulatory Injury	31	14	11	56	2%	24	2%	80	2%
	Visible Injury	169	123	51	343	10%	205	17%	548	12%
	Non-visible Injury	267	273	95	635	18%	221	18%	856	18%
	Property Damage Only	1115	891	445	2451	70%	759	63%	3210	68%
Light Condition	Daylight	953	841	379	2173	62%	835	69%	3008	64%
	Dark / Dawn	64	73	28	165	5%	63	5%	228	5%
	Dark Light On	465	317	158	940	27%	259	21%	1199	25%
	Dark No Lights	72	43	27	142	4%	37	3%	179	4%
	Other / Unknown	31	29	11	71	2%	18	1%	89	2%
Weather Condition	Clear	1249	996	349	2594	74%	907	75%	3501	74%
	Foggy	6	5	3	14	0%	10	1%	24	1%
	Raining	237	203	215	655	19%	185	15%	840	18%
	Snow / Sleet	17	27	11	55	2%	17	1%	72	2%
	Severe Winds	1	1	0	2	0%	1	0%	3	0%
	Other / Unknown	75	71	25	171	5%	86	7%	257	5%
Time of Day	AM Peak Hours (6 am - 10 am)	413	391	180	984	28%	319	26%	1303	28%
	Mid-day Hours (10 am - 3 pm)	184	189	115	488	14%	44	4%	532	11%
	PM Peak Hours (3 pm - 7 pm)	116	115	23	254	7%	70	6%	324	7%
	Off Peak Hours (7 pm - 6 am)	110	111	48	269	8%	223	18%	492	10%
Total Crashes by Facility		1585	1303	603	3491	100%	1212	100%	4703	100%

Proportion of Crashes by Time of Day by Freeway

Time of Day (Hour)	Proportion of Crash Frequency			
	I-270	I-270Y	I-495	I-495 VA
0	2%	2%	2%	1%
1	1%	1%	2%	1%
2	2%	1%	1%	0%
3	1%	2%	2%	1%
4	2%	2%	2%	1%
5	2%	1%	2%	2%
6	5%	2%	5%	3%
7	6%	5%	5%	5%
8	7%	4%	5%	7%
9	7%	4%	5%	7%
10	6%	6%	5%	3%
11	5%	3%	4%	3%
12	4%	4%	3%	3%
13	4%	4%	5%	5%
14	4%	8%	5%	9%
15	5%	10%	7%	12%
16	7%	7%	8%	10%
17	9%	12%	8%	9%
18	8%	8%	9%	7%
19	4%	3%	5%	4%
20	3%	5%	3%	3%
21	3%	1%	3%	2%
22	3%	3%	2%	1%
23	2%	1%	2%	1%
Total	100%	100%	100%	100%

Historical Crash Rates

I-270 & East Spur – Crash Rates by Quarter-Mile Segments in 100 Million Vehicle Miles Traveled

MP	Reference Interchange / Cross Street	Fatal and Injury Crash Rate by Facility (Statewide Average Fatal and Injury Rate for Urban Interstate = 16.1)		PDO Crash Rate by Facility (Statewide Average PDO Rate for Urban Interstate = 28.2)		Total Crash Rate by Facility (Statewide Average Total Rate for Urban Interstate = 44.3)	
		NB GPL	SB GPL	NB GPL	SB GPL	NB GPL	SB GPL
1.35		56	63	165	59	221	122
1.6	MD 187	41	9	92	44	133	54
1.85	Rockledge Boulevard	9	13	22	9	32	22
2.1		0	3	3	0	3	3
2.35		0	0	6	3	6	3
2.6		32	44	57	82	88	126
2.85		1	0	0	1	1	1
3.1		12	10	23	15	35	25
3.35		0	1	0	0	0	1
3.6		0	3	3	3	3	6
3.85		6	1	10	17	16	19
4.1	Montrose Road	39	52	62	91	102	144
4.35		1	4	3	6	4	10
4.6		1	1	1	1	3	3
4.85		3	4	4	15	7	19
5.1	Wootton Parkway	3	1	4	3	7	4
5.35		25	30	58	39	83	69
5.6	Falls Way	0	4	4	1	4	6
5.85		0	0	0	1	0	1
6.1		0	0	7	1	7	1
6.35		43	52	121	70	165	123
6.6	MD 28	0	2	3	3	3	5
6.85		0	0	0	0	0	0
7.1		0	0	2	0	2	0
7.35		27	12	50	30	77	42
7.6	W. Gude Drive	0	0	2	2	2	2
7.85		0	0	3	3	3	3
8.1		18	3	27	8	45	12
8.35	Shady Grove Road	50	35	115	80	165	115
8.6		0	0	0	2	0	2
8.85		0	3	12	3	12	7
9.1		26	28	73	49	99	77
9.35	I-370	5	5	17	7	22	12
9.6		3	3	2	5	5	9
9.85		10	0	15	3	26	3
10.1	Muddy Branch Road	21	21	51	27	72	48
10.35		3	12	7	9	10	21
10.6		7	3	15	10	22	14
10.85	MD 117	22	12	50	14	72	26

I-270 & West Spur – Crash Rates by Quarter-Mile Segments in 100 Million Vehicle Miles Traveled

MP	Reference Interchange / Cross Street	Fatal and Injury Crash Rate by Facility (Statewide Average Fatal and Injury Rate for Urban Interstate = 16.1)		PDO Crash Rate by Facility (Statewide Average PDO Rate for Urban Interstate = 28.2)		Total Crash Rate by Facility (Statewide Average Total Rate for Urban Interstate = 44.3)	
		NB GPL	SB GPL	NB GPL	SB GPL	NB GPL	SB GPL
0		0	11	6	17	6	28
0.25		17	6	34	25	50	31
0.5		0	0	25	20	25	20
0.75		14	20	22	20	36	39
1	Democracy Blvd	24	21	59	51	83	72
1.25		0	0	0	0	0	0
1.5	Westlake Terrace	0	0	0	0	0	0
1.75		0	3	5	0	5	3
2	I-270	0	0	0	3	0	3

I-495 in Maryland – Crash Rates by Quarter-Mile Segments in 100 Million Vehicle Miles Traveled

MP	Reference Interchange / Cross Street	Fatal and Injury Crash Rate by Facility (Statewide Average Fatal and Injury Rate for Urban Interstate = 16.1)		PDO Crash Rate by Facility (Statewide Average PDO Rate for Urban Interstate = 28.2)		Total Crash Rate by Facility (Statewide Average Total Rate for Urban Interstate = 44.3)	
		NB GPL	SB GPL	NB GPL	SB GPL	NB GPL	SB GPL
0	Virginia Stateline	13	10	30	24	43	35
0.25		7	7	22	48	29	55
0.5	Clara Barton Pkwy	7	16	22	36	29	52
0.75		0	0	0	0	0	0
1	Parsimmon Tree Rd	8	0	25	15	33	15
1.25		9	5	23	19	33	23
1.5		5	2	3	9	8	11
1.75	Seven Locks Rd	0	3	8	9	8	12
2		3	9	9	14	12	23
2.25		60	47	92	100	151	147
2.5	MD 190	0	1	1	4	1	6
2.75		0	0	0	0	0	0
3		0	3	1	3	1	6
3.25		7	12	14	25	21	37
3.5		18	15	51	43	69	58
3.75	I-270Y	3	3	9	12	12	15
4		6	24	30	71	36	95
4.25	Greentree Rd	3	6	3	18	6	24
4.5		12	21	15	24	27	44
4.75		3	12	24	33	27	44
5	Fernwood Rd	3	3	0	3	3	6
5.25		0	0	3	6	3	6
5.5		30	36	80	116	110	151
5.75	MD 187	0	0	3	3	3	3

I-495 in Virginia – Crash Rates by Quarter-Mile Segments in 100 Million Vehicle Miles Traveled

Start NB MP	End NB MP	Reference Interchange / Cross Street	Fatal and Injury Crash Rate by Facility (Statewide Average Fatal and Injury Rate for I-495 NB = 29.94 for I-495 SB = 25.68)		PDO Crash Rate by Facility (Statewide Average PDO Rate for I-495 NB = 67.37, for I-495 SB= 60.52)		Total Crash Rate by Facility (Statewide Average Total Rate for I-495 NB = 97.31, for I-495 SB = 86.2)	
			NB GPL	SB GPL	NB GPL	SB GPL	NB GPL	SB GPL
13.86	14.11		46	11	148	61	194	72
14.11	14.36	Route 193	42	25	141	72	183	98
14.36	14.61		48	3	70	24	119	27
14.61	14.86		42	9	115	49	157	58
14.86	15.11	GWMP	58	15	0	67	58	82
15.11	15.36		48	18	0	52	48	70

I-270 & East Spur – Volume Inputs used for Crash Rate Calculations

Beginning MP	Ending MP	ADT	Conversion Factor	AADT
0	1.54	114080	0.97	110658
1.54	2.7	119240	0.97	115663
2.7	4.14	259590	0.97	251802
4.14	4.9	252840	0.97	245255
4.9	5.5	252840	0.97	245255
5.5	6.46	251660	0.97	244110
6.46	7.57	225890	0.97	219113
7.57	8.39	225890	0.97	219113
8.39	9.26	216085	0.97	209602
9.26	10.9	219695	0.97	213104

I-270 West Spur – Volume Inputs used for Crash Rate Calculations

Beginning MP	Ending MP	ADT	Conversion Factor	AADT
0	1	134665	0.97	130625
1	1.2	140455	0.97	136241
1.2	2.1	140455	0.97	136241

I-495 in Maryland – Volume Inputs used for Crash Rate Calculations

Beginning MP	Ending MP	ADT	Conversion Factor	AADT
0	0.52	243950	1.04	253708
0.52	2.21	226740	1.04	235810
2.21	3.7	253165	1.04	263292
3.7	5.85	118495	1.04	123235

High Crash Locations Methodology for Ramps, Adjacent Intersections and Ramp Terminals along the Crossroads

HIGH CRASH LOCATION ANALYSIS METHODOLOGY FOR RAMPS, ADJACENT INTERSECTIONS & RAMP TERMINALS ALONG CROSSROADS

Identification of High Crash Locations along freeway ramps, ramp terminals, and adjacent intersections along the crossroads involved:

- A spatial cluster analysis using ArcGIS, and
- A review of the crash summary reports provided by MDOT SHA's Office of Traffic and Safety for the historical crashes between January 1, 2016, and December 31, 2018.

Crashes exclusive to crossroad segments, intersections, and ramps were plotted using the latitude and longitudinal points included in the historical crash data spreadsheets provided by MDOT SHA. Using the Buffer tool, the plotted crashes were clipped to only include crashes within the Study limits in the spatial cluster analysis. To define crashes as an intersection or segment related crash, the Integrate tool was run to join all crash points within a specific tolerance of one another utilizing a 100-foot tolerance for roadway segments and a 250-foot tolerance for intersections. Finally, the Collect Events tool was used to group the crash points into a single feature point from which the total number of crashes can be derived for a specific location to help identify locations with more than 20 crashes. Ramp crashes were grouped manually. Once the high crash locations were determined, the detailed crash data provided by MDOT SHA was reviewed to determine specific crash type patterns and time of day patterns.

The high crash ramp locations developed through this process include:

1) I-270 NB Exit Ramp to I-370
2) I-270 SB Exit Ramp to Shady Grove Rd / Omega Dr
3) I-270 NB Exit Ramp to Shady Grove Rd / Redland Blvd
4) I-270 Exit Ramp to MD 28 WB
5) I-270 SB Exit Ramp to Montrose Rd EB

The high crash ramp terminals and adjacent intersections along crossroads developed through this process include:

1) MD 119 at Sam Eig Highway Intersection
2) I-270 NB Ramp Terminal at Shady Grove Road
3) Shady Grove Road at Choke Cherry Road Intersection
4) Wootton Parkway at Seven Locks Road Intersection
5) Wootton Parkway at Tower Oaks Boulevard Intersection
6) Montrose Road at Tower Oaks Boulevard Intersection
7) MD 187 at Tuckerman Lane Intersection
8) MD 355 at Grosvenor Lane

Note that the Montrose Road at Tower Oaks Boulevard intersection has less than 20 crashes (specifically 16) but is included in the high crash locations list due to a significant rear end (7 crashes) and angle (5 crashes) crash pattern.